SEPTEMBER, 1949

IRE
D WIRE PRODUCTS

VAUGHN Ringblox CIRCULAR TANDEM MACHINE

"GOING PLACES" FAST!

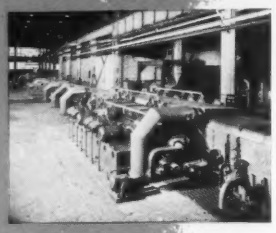
"Quick on the Draw!"
VAUGHN MACHINERY
PROFITABLY USED BY LEADING WIRE MILLS SINCE 1871

Since 1947, over two hundred of these new circular tandem machines have been installed in America's progressive wire mills . . . where they are handling intermediate and fine wire sizes with profitable speed and efficiency . . . in ferrous, non-ferrous materials and their alloys. The key to this rapid acceptance is *performance*. May we give you the details?

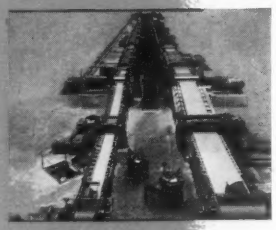
The VAUGHN MACHINERY COMPANY
CUYAHOGA FALLS, OHIO, U. S. A.

COMPLETE COLD DRAWING EQUIPMENT . . . Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION



Continuous Strip Cleaning Line



Pickle Line

Electrolytic Line

The WEAN ENGINEERING Company, Inc.

WARREN, OHIO

Specialists in Sheet, Tin and Strip Mill Equipment

Associate Companies

Wean Equipment Corporation
Cleveland, Ohio

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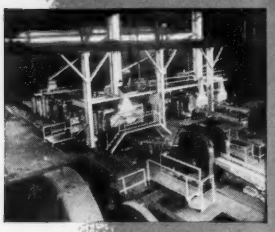
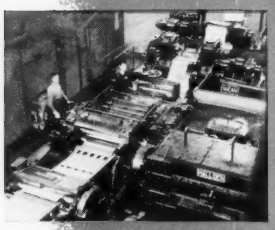
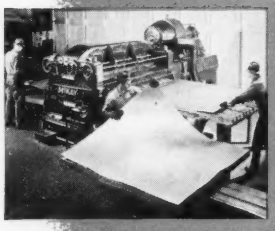


Mechanized Sheet Mill



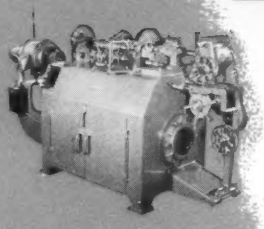
Tin Plate Shearing



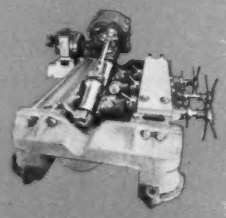
Backed Up Leveler for Wide Sheets

Wean Equipment Corporation

CLEVELAND, OHIO



Barbed-Wire Machine



Entry End of Tube Straightener

HOLMQUIST BARBED WIRE AND WIRE FENCE MACHINERY

THE WEAN EQUIPMENT CORPORATION are recognized as specialists in high-efficiency narrow strip, wire mill and straightening equipment.

COLD ROLLING MACHINERY

For 36" Wide Material and Narrower

MILLS - REELS - SLITTERS - LEVELERS
COILERS - EDGERS - SCALE BREAKERS - SHEARS
SCRAP BALLERS - CONTINUOUS PICKLING

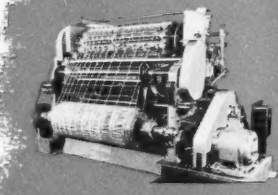
WIRE MILL EQUIPMENT

PATENTING, GALVANIZING AND TINNING TAKE-UP FRAMES
WIRE FLATTENING MILLS - SPOOLERS - NAIL GALVANIZING AND BLUEING EQUIPMENT - FIELD FENCE AND BARBED WIRE MACHINES

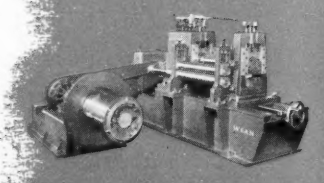
TUBE BAR AND SHAPE STRAIGHTENING MACHINERY

WEAN EQUIPMENT CORPORATION

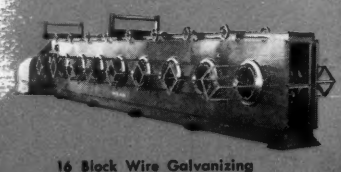
22800 LAKELAND BLVD. • CLEVELAND, OHIO



No. 1155 Farm and Field Fence Machine



Strip Reel and Slitting Unit



16 Block Wire Galvanizing Take-Up Frame

CARBOLOY flat wire rolls outlast steel 48–1

—large eastern mill reports

Setup time reduced 6 to 1; more uniform wire produced with superior finish

Think of it!—In a large eastern rolling mill, 6" flat wire rolls of Carboloy cemented carbide have been in use over one year, 24 hours per day, 5 days per week—and it has not been necessary to regrind them to date.

Here are more benefits

You'll find these other production figures interesting, too. Look at this:

- **Spot changes,** twice a week with steel, now only every six months—outlasting steel at a ratio of 48 to 1.
- **Setup time** cut from two hours every month with steel rolls to two hours every six months with Carboloy.

Carboloy has brought increased production, longer roll life and lowered manufacturing costs to this eastern mill. Rolling high and low carbon steel wire for bobby pins, stitch and spring wire and similar products, they *know* Carboloy rolls are good.

Why not find out for yourself how much good, savings-wise, Carboloy flat wire rolls can do in your mill. Write today for further information. Carboloy Company, Inc., 11171 E. 8 Mile Blvd., Detroit 32, Michigan.

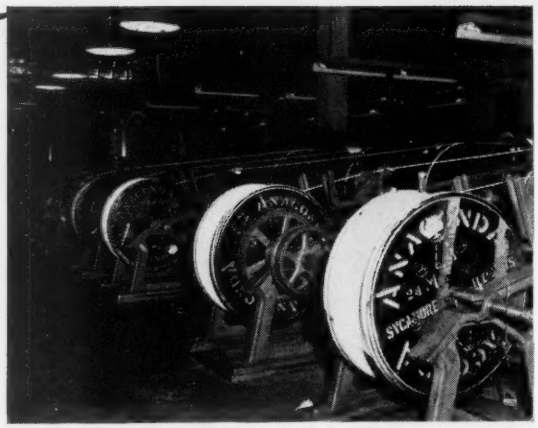
With Carboloy, you'll get all these advantages in your flat roll operations:

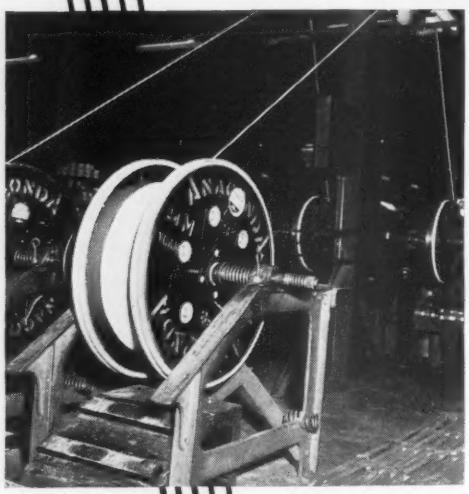
- **Less down time for spot changes and setup**
- **Longer roll life**
- **Better product finish**
- **Less regrinding down time**
- **Increased production**

CARBOLOY®

CEMENTED CARBIDE

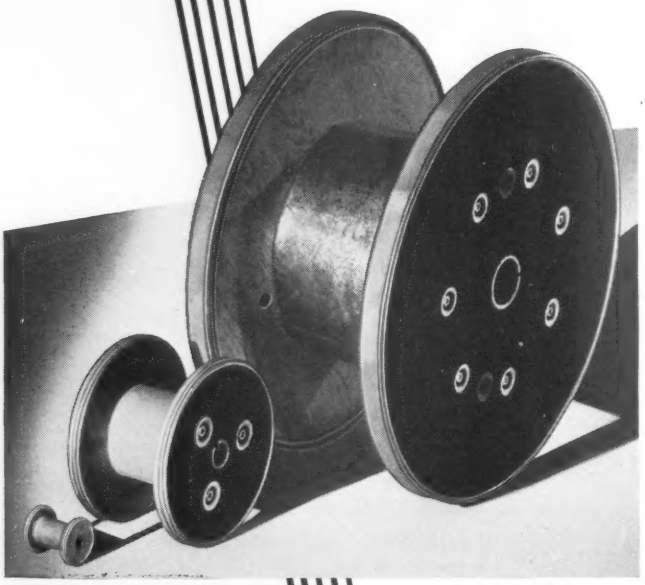
Right and Below: Hubbard 24" x 6" Metal Bound Reels in the Magnet Wire Department of the Anaconda Wire & Cable Company, Sycamore, Illinois.





"Many years use... ....entirely satisfactory"

The highly satisfactory service that these Hubbard Reels give Anaconda Wire & Cable Company is typical. Hubbard Metal Bound Spools and Reels have an industry-wide reputation for long-life. Normal "life-expectancy" is high even under the most severe conditions because of exceptionally sturdy construction. Woods for the flanges are selected for toughness and thoroughly seasoned. Steel rims, or "tires", give added stability and prevent chipping or splintering of edges. Make Hubbard your dependable source of supply for all types and sizes of spools, reels and traverses for manufacturing, shipping, and storing of wire. Standard types and sizes numbering in the thousands assure you of quality at minimum cost. Write for quotation on price and delivery.

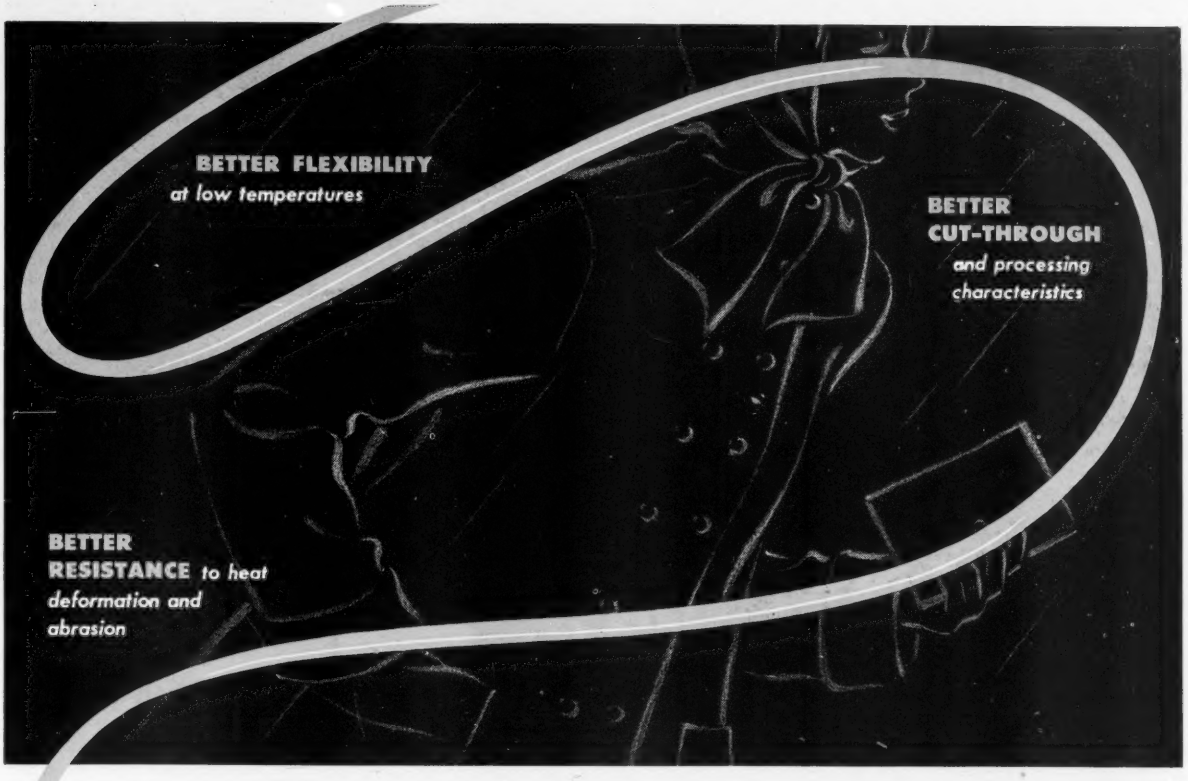


HUBBARD SPOOL COMPANY
1624 Carroll Avenue • Chicago 12, Illinois

Hubbard

STEEL SPOOLS AND REELS . . . METAL BOUND SPOOLS AND REELS . . . STEEL TRAVERSES LIGHT WEIGHT REELS . . . WOOD REELS

WIRE & WIRE PRODUCTS, Vol. 24, No. 9, September, 1949. Publication Office, at One Sherman Ave., Jersey City 7, N. J. Executive Office, 300 Main Street, Stamford, Conn. Published monthly by the Quinn-Brown Publishing Corp., Richard E. Brown, President; K. S. Spengel, Secy. and Treas. Subscription price: U. S. $5.00; Canada, $5.00 per year; 50 cents per copy; Foreign, $7.50 per year. Entered as second class matter, January 10, 1949, at the Post Office, Jersey City, N. J., under Act of March 3, 1879.



Here's why *better* coats and jackets are made from Marvinol®

WHEN it comes to coating wire, Marvinol VR-10, a superior vinyl resin, offers you these many advantages. Marvinol coats and jackets are dry, tough, abrasion resistant. They're flexible always . . . even at low temperatures. They resist shrinkage and heat deformation because Marvinol gives them superior dimensional stability.

Marvinol plastics withstand the destructive forces of light, aging, oils, acids. They're waterproof, tear-resistant with better cut-through.

In processing, Marvinol can reduce your costs through time savings on pre-mix, Banbury and open mill stages. Marvinol offers possibilities for faster extrusion cycles.

If you do not do your own compounding, let us show you how you can save money by performing this stage right in your own plant.

The Glenn L. Martin Company makes and sells Marvinol vinyl resin as a raw material to processors. It compounds and fabricates *only* in modern customer service laboratories for *your* benefit. So if you *make* coats and jackets for wire and want information . . . or if you *use* coated wire and want the name of someone now coating wire with Marvinol, write to Chemicals Div., Dept. W-9, The Glenn L. Martin Company, Baltimore 3, Maryland.

MANUFACTURERS OF: Dependable Martin 2-0-2 airliners • Advanced military aircraft • Revolutionary rockets and missiles • Electronic fire control systems • Versatile Marvinol resins (Martin Chemicals Division) • **DEVELOPERS OF:** Mareng fuel tanks (licensed to U. S. Rubber Co.) • Stratovision aerial re-broadcasting (in conjunction with Westinghouse Electric Corp.) • Honeycomb construction material (licensed to U. S. Plywood Corp.) • New type hydraulic automotive and aircraft brake • Permanent fabric flameproofing • **LEADERS IN RESEARCH** to guard the peace and build better living in many far-reaching fields.

Martin® Marvinol

RESINS, PLASTICIZERS AND STABILIZERS PRODUCED BY THE CHEMICALS DIVISION OF

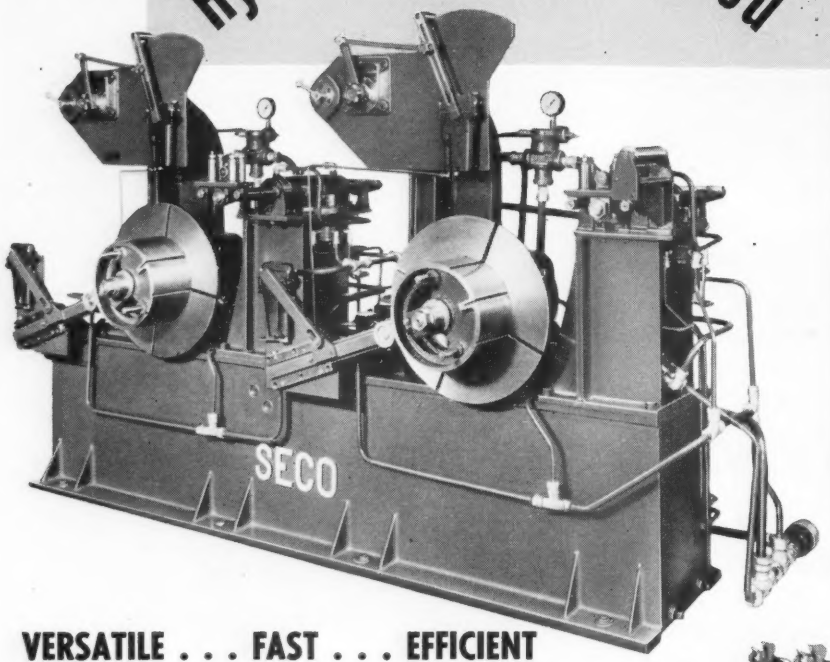
THE GLENN L. MARTIN COMPANY • AN INTERNATIONAL INSTITUTION

"BETTER PRODUCTS, GREATER PROGRESS, ARE MADE BY MARTIN."

They Said It Couldn't Be Built . . . but We Did It!

SECO *Presents*

ITS NEW Hydraulically Operated WIRE SPOOLER



- Revolutionary Design!
- Quick Speed Adjustment!
- Controlled Tension!
- Adjustable Traversing!
- High Accuracy!

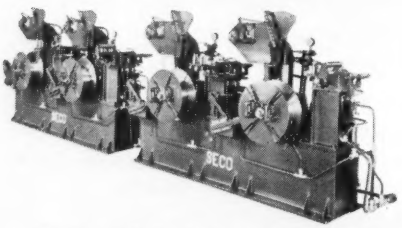
VERSATILE . . . FAST . . . EFFICIENT

ENTIRELY NEW in DESIGN and ENGINEERING

SECO, with its new Hydraulically Operated Wire Spooler, presents a revolutionary development in efficient wire spooling. An infinitely variable speed range from 0 to 4,000 FPM—accurate, adjustable traversing for wire gauges varying up to 20:1—controlled tension—and a new, original design that gives sensitive, fully adjustable operation—are among the superior features of this new Spooler.

A new rider-roll control, developed by SECO, automatically compensates for increase in coil diameter—assuring a constant linear spooling speed.

Each Spooler is engineered to solve your present production problem—with built-in flexibility to meet future requirements. Construction is rugged and compact—designed for economy, safety and ease of maintenance. Write today for full details and operating data.



The Four Spindle Duplex Traverse Reel installation shown above handles tinned copper wire at speeds from 150 to 600 FPM. Wire sizes range from .100" thick by .200" wide to .045" thick by .500" wide. Wire is coiled on collapsible blocks, 10" diameter, 6" wide with 18" flanges for 250 pound coils —or on spools with 14" diameter cores, 6" wide with 24" flanges holding 450 pounds of wire. Tension from 75 to 150 pounds is regulated by a pressure control valve.

STEEL EQUIPMENT CO.

2890 EAST 83rd STREET • CLEVELAND 4, OHIO

SECO

How much do you know about wire drawing lubricants?

Even the Experts Call for Help from Standard

Right off the bat, we'd like you to know that we're not in the business of "Stumping the Experts". As a matter of fact, most everything we know about wire drawing lubricants *(and we think it's quite a lot)* is the result of our close cooperation with leading wire producers all over the country.

Naturally, we're specialists in the development of special-purpose compounds for faster, better wire drawing. And because we *are,* and because we've learned so much from working with *you* and *you* and *you,* it's only natural for any one of you to call us in when the going gets rough or when there's a special problem calling for technical help.

We'd like you to know that there's a STANDARD Service Engineer ready to work with you on any lubrication problem you may have. He's a mighty good man to know — and he's ready, willing and *able* to help on a moment's notice. *Let's hear from you!*

STANDARD SERVICE CENTERS

INDUSTRIAL COMPOUNDS CO.
C. R. Mehl, President
2037 Sacramento Blvd.
Los Angeles 21, California

INDUSTRIAL COMPOUNDS CO.
C. R. Mehl, President
2425 Seventeenth Street
San Francisco, California

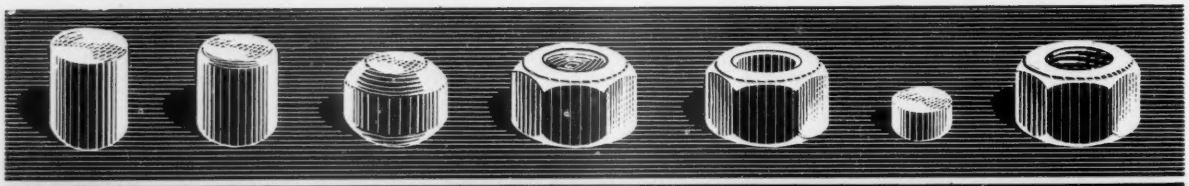
STANDARD INDUSTRIAL COMPOUNDS COMPANY
William Kinnery
Millbury, Massachusetts

WIRE DRAWING LUBRICANTS

Standard

INDUSTRIAL COMPOUNDS CO.

4600 WEST FERDINAND STREET
CHICAGO 44, ILLINOIS



Inviting your inspection

BECAUSE Youngstown "Scrapless" Nut Wire is designed for modern cold-heading operations, it invites your critical tests. You'll find its sizing accurate and its composition correct. It measures up on chemical and metallurgical checks for analysis and micro-examinations.

Available in various compositions, including AISI standard as well as special sulphurized steels.

QUALITY · YOUNGSTOWN · SERVICE

Youngstown

"SCRAPLESS" NUT WIRE

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

General Offices — Youngstown 1, Ohio

Export Office - 500 Fifth Avenue, New York

WIRE - COLD FINISHED CARBON AND ALLOY BARS - PIPE AND TUBULAR PRODUCTS - CONDUIT - RODS - SHEETS - PLATES - BARS - ELECTROLYTIC TIN PLATE - COKE TIN PLATE - RAILROAD TRACK SPIKES.

ALUMINUM LASTS

...it *keeps* your wire goods sold

Look what a milk bottle carrier does. It knocks around in a truck all day. Carries wet bottles. Stands repeated steaming. Yet it stays on the job year after year when made of Alcoa Aluminum Wire. Because aluminum *lasts.*

Make *your* products of Alcoa Wire and you offer the same highly salable advantage of long life.

Your shopmen will like the way Alcoa Wire forms on your present equipment. Simple procedures make painted and plated finishes cling to it. Or you can eliminate finishing altogether. Your local Alcoa salesman will tell you more about this economical wire that goes three times further than heavy metals. Ask him to furnish you with free books like "Alcoa Aluminum and Its Alloys" plus "Finishes for Alcoa Aluminum". Or write ALUMINUM COMPANY OF AMERICA, 1828J Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA FIRST IN ALUMINUM

ALCOA ALUMINUM ®

INGOT • SHEET & PLATE • SHAPES, ROLLED & EXTRUDED • WIRE • ROD • BAR • TUBING • PIPE • SAND, DIE & PERMANENT MOLD CASTINGS • FORGINGS • IMPACT EXTRUSIONS
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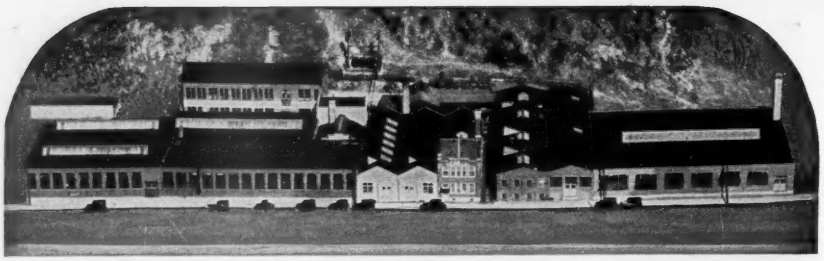
HUDCO



HUDSON WIRE CO. PLANT AT OSSINING, N. Y.

This plant is one of the most up-to-date and completely equipped plants in the world for the production of "HUDCO" fine wires in all metals.

ESTABLISHED IN 1902

HUDCO

WIRES FOR METAL SPRAYING

Pure lead, Lead Alloy, Pure Zinc, Zinc Alloy, Copper, Tin, High Brass, Low Brass, Solder Wire. High Conductivity, Electric Wire. Cadmium, Nickel Silver, Aluminum, Monel Metal, Prosphor Bronze, Pure Nickel, Commercial Bronze, Brush Wires, Crimp and Straight, Brass, Steel, Nickel Silver, Copper and Prosphor Bronze.

HUDCO

FINE BARE WIRES

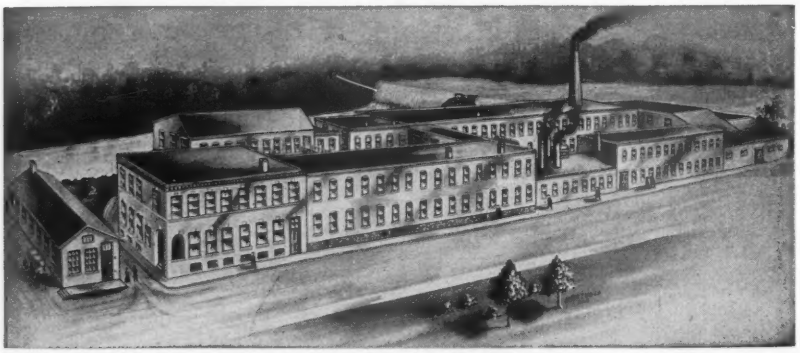
High Brass, Low Brass, Zinc 99.99+ and High Tensile Zinc, Commercial Bronze, Phosphor Bronze, Pure Tin, Lead, Antimonial Lead, Tinsel Lahns, Silver Plated Copper, False Gold and Copper. Cadmium, Nickel Silver Silver Plated Copper, False Gold and Special Brass and Bronze Alloys to Specifications, Metallic Fibre for Packing Purposes, Copper Bronze, Zinc, Lead and Aluminum.

"HUDCO" specially processed Copper Wire for enamelling purposes is drawn from selected Copper, insuring the maximum conductivity. This is but one example of the use of the most advanced and approved materials and methods in our processing.

BETTER WIRE AT LOWER COST

Send Us Your Specifications and Let Us Quote Prices

HUDSON WIRE COMPANY • OSSINING, N. Y.



Winsted Division of HUDSON WIRE CO. at Winsted, Conn., modern and completely equipped enamelled wire plant for LEAKPROOF ENAMELLED WIRE and all standard and special coverings.

WINCO

"WINCO" enamelled wire is drawn from special selected copper, assuring perfect enamelling. All wire tested before shipment.

"WINCO" enamelled wire is available in all standard and special coverings made to meet exacting requirements.

Samples of LEAKPROOF and other enamelled wires sent on request

WINSTED DIVISION OF HUDSON WIRE COMPANY

WINSTED, CONN.

Can you use $50,000 a year... or more?

THAT'S a silly question . . . who *couldn't* use $50,000 a year? Well, that's something like what Magnus is prepared to save your stainless steel department on lead, or whatever metallic coating you may be using to draw stainless steel wire.

Let's get stainless steel out of the luxury class, and down where more consumers can afford it. Everyone knows that there are uses for stainless steel wire that haven't been considered yet because the price is too far out of line. Production has been so costly and so difficult up until now that stainless has always been a "specialty" wire. This no longer holds true.

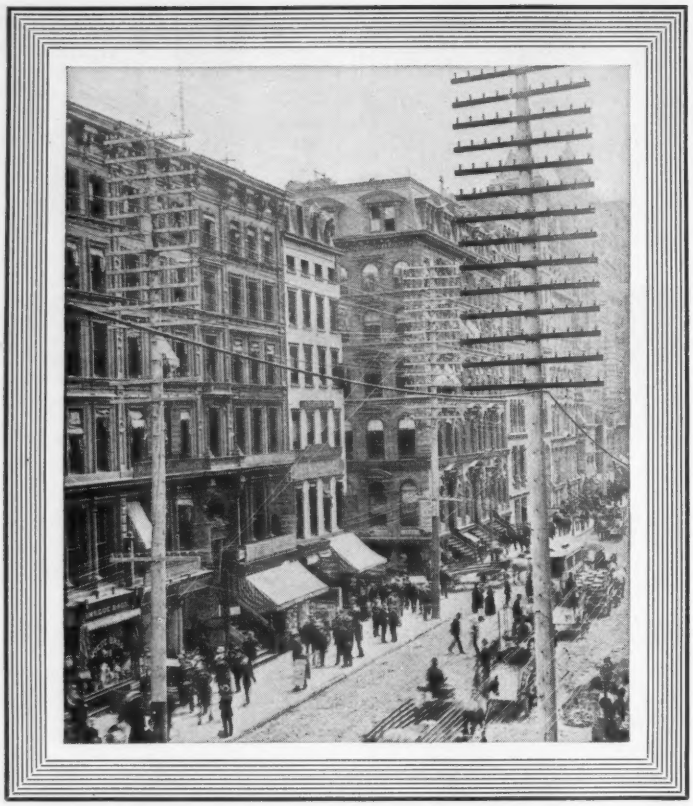
You alone are in a position to know what your production costs are for stainless wire — but whatever they are, the Magnus Metalcoat #267 process will cut them to a fraction. This $50,000 a year figure represents the saving on lead and nitric acid only, but there are many more savings to be had.

Now is the time, when the entire country is becoming more and more cost-conscious, to give some thought to your plant economy. Metalcoat #267, together with Magnus Dri-Draw #4, which is the lubricant especially designed for use on stainless steel, can certainly help your mill to cut production costs.

The Magnus Metalcoat #267 process is described in our new booklet . . . have you written for your copy?

Metal Coating Division

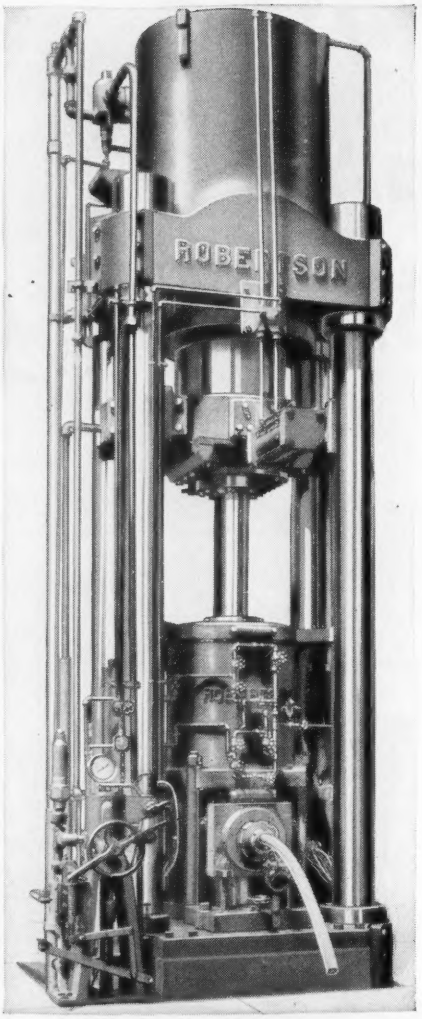
MAGNUS CHEMICAL CO., INC.
188 South Avenue
Garwood New Jersey



Broadway 1882—"B.E.U.T.C."

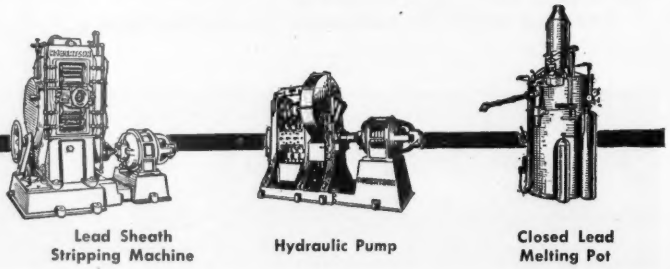
In 1882—"BEUTC" (Before Empire Underground of Telephone Communications)—Broadway was interlaced with a network of unsightly electric wires and poles. But men with imagination and foresight, who were the *true pioneers* of laying lead encased cables underground, envisioned a Broadway of the future as it appears today.

Synonymous with these *pioneers* is Robertson High Pressure Hydraulic Equipment. TWENTY-FOUR YEARS BEFORE THE BROADWAY OF 1882, Robertson began designing and producing hydraulic equipment *exclusively* for the cable and hose industries . . . Today, the world could be encircled many times with lead encased cables produced on Robertson Equipment. Throughout its 91 years' experience in producing "custom-built" equipment, Robertson has become a "leader serving leaders" in the cable and hose industries.



CABLE LEAD ENCASING PRESS

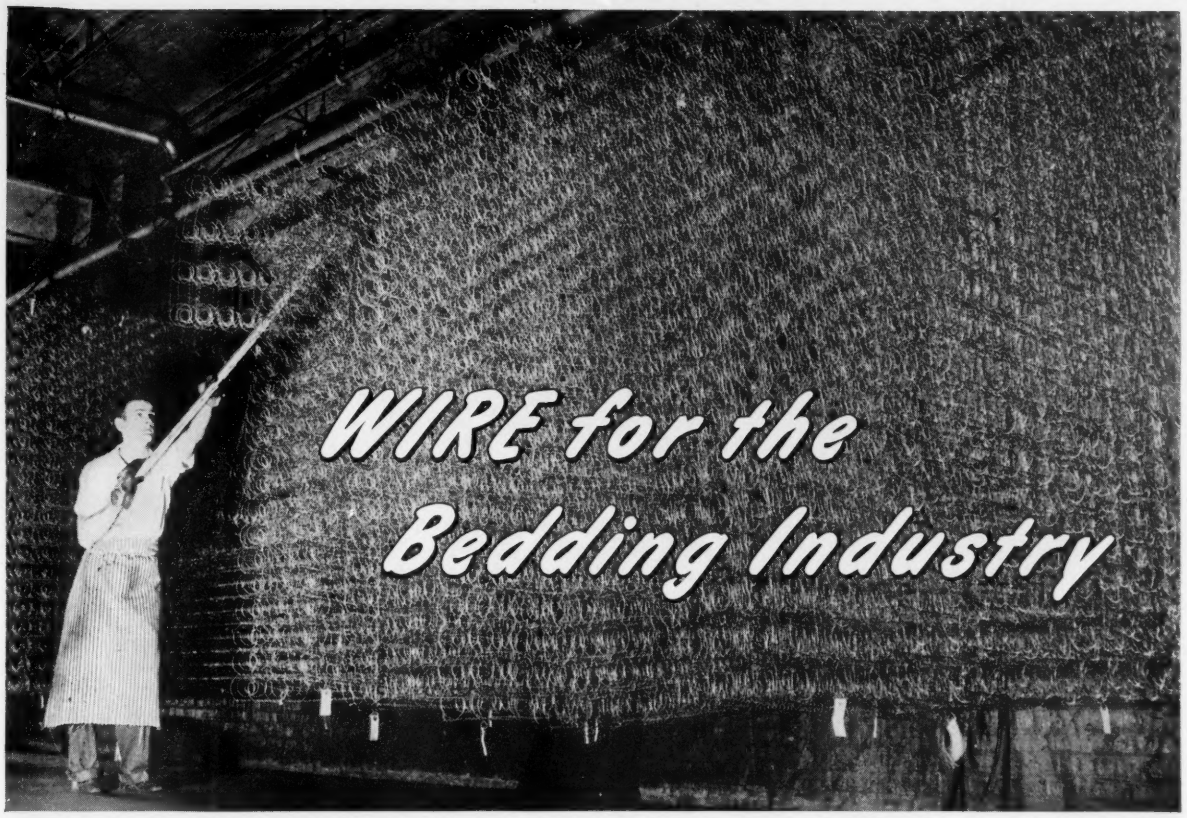
JOHN Robertson
COMPANY INCORPORATED
125-117 WATER STREET, BROOKLYN 1, NEW YORK
Designers and Builders of all Types of Lead Encasing Machinery
Since 1868



Lead Sheath Stripping Machine

Hydraulic Pump

Closed Lead Melting Pot



UPHOLSTERY SPRING WIRE in all grades

HIGH-TENSILE MB WIRE for special applications

LOW-CARBON FRAME WIRE for spot welding

BORDER AND BRACE WIRE high- and low-carbon grades

HOG RING WIRE

LINK-FABRIC WIRE

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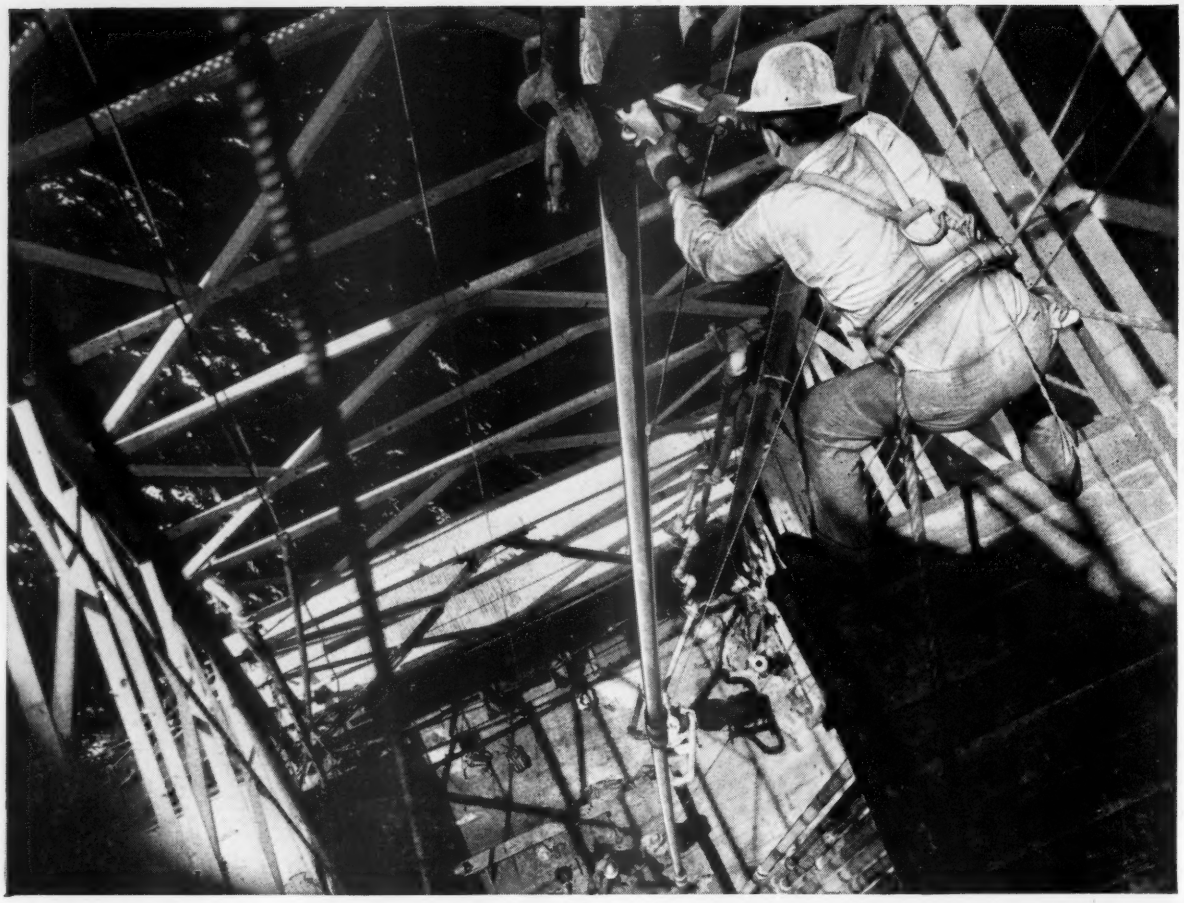
Silver Star SPRING WIRE BETHLEHEM STEEL COMPANY

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

Export Distributor: Bethlehem Steel Export Corporation



This mutual friend works two miles down

Frequently work must halt for days while the anxious crew fishes lost instruments, worth thousands of dollars, out of a hole a couple of miles deep.

Ordinary steel measuring line that lowers these expensive instruments into the well often snaps from the corrosive mixture of briny water and "sour" oil and gas. To avoid costly breaks and delays a more durable measuring line is now made of Armco Stainless Steel Wire.

This same solid, corrosion-resisting wire can also be a valued friend to you and your customers.

Manufacturers like Armco Stainless Wire because it offers one of the easiest ways to increase the sales appeal of a good product. And sometimes the product costs less because no plating is needed. Consumers approve Armco Stainless Wire because it has lasting beauty, strength, and long life.

You can fabricate this versatile wire on the same machines you use for regular steel. It can be readily drawn, formed, cold-headed, or swaged. Joining by welding or soldering is simple.

Why not look over the possibilities for Armco Stainless Steel Wire? We'll be glad to work with you on cost-analyses for specific products.

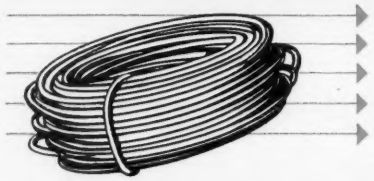
For detailed information write Armco Steel Corporation, 3549 Curtis Street, Middletown, Ohio.

EXPORT: THE ARMCO INTERNATIONAL CORPORATION.

ARMCO STEEL CORPORATION

ARMCO

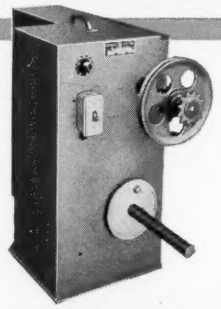
HOW TO TRANSFORM THIS



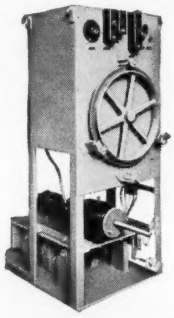
INTO THIS*

Quickly and at Less Cost

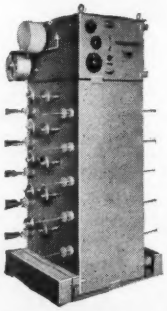
***OR REEL TO REEL**



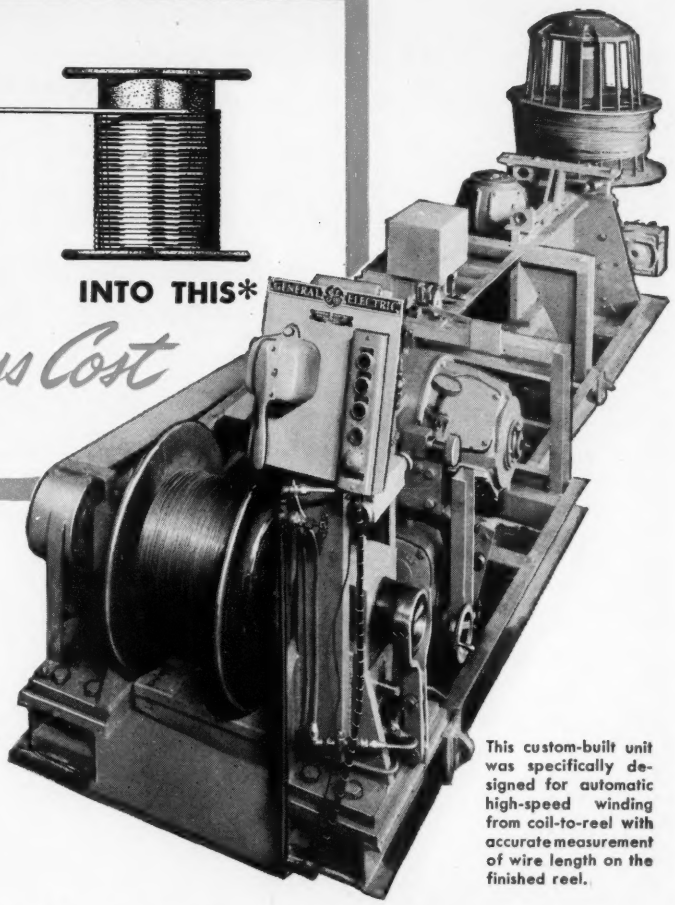
Individual winding heads with their own traverse mechanism. Can be combined with a capstan in any number to comprise a multi-head equipment.



Wire speed and tension is maintained automatically by electronic controls on this combination capstan and pickup mechanism.



Multi-head machines are available with capstan, gang-traverse mechanism, winding heads, and speed and tension control installed in a single unit.



This custom-built unit was specifically designed for automatic high-speed winding from coil-to-reel with accurate measurement of wire length on the finished reel.

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There's a faster, better way to wind or rewind wire from coil-to-reel or reel-to-reel—with General Electric's new completely electrified automatic wire-winding equipment.

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You can put your confidence in

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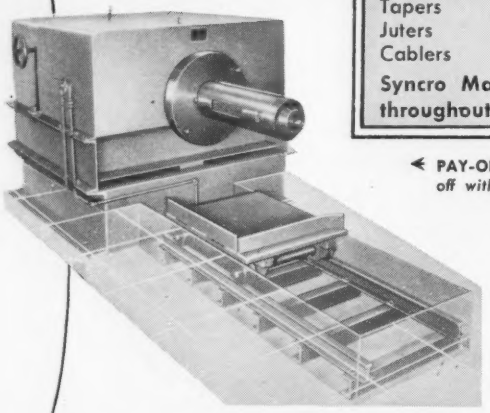
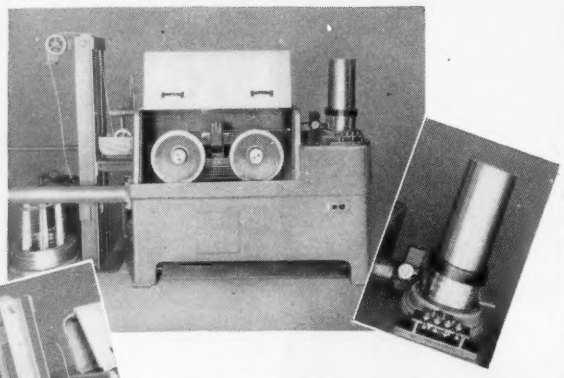
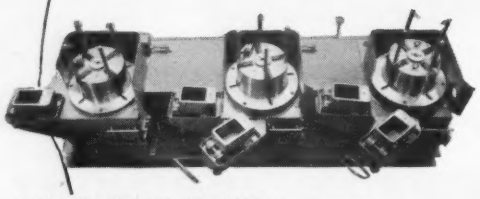
Tapers	Heavy Duty Take-Ups	Wire Insulators
Juters	Continuous Electric Annealers	Die Stringers
Cablers		Special Machinery

Syncro Machines are in active operation in leading wire plants throughout the world.



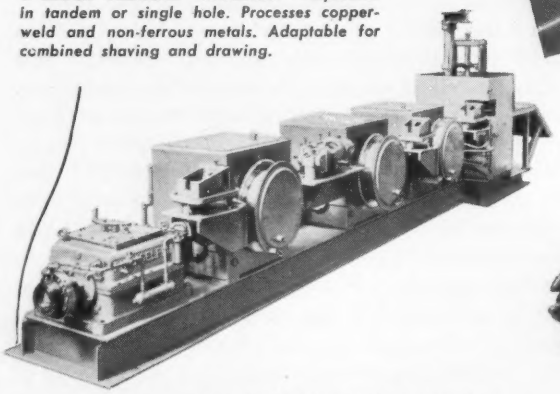
◄ **PAY-OFF REEL STAND**—*Loads heavy reels for pay-off without overhead cranes or pick-up grapples.*



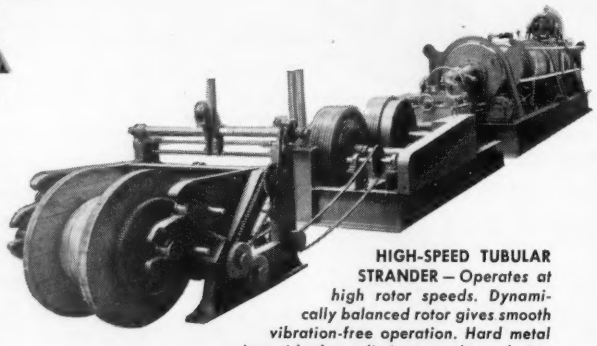


3 BLOCK VERTICAL "TROLLROD"—*Operates in tandem or single hole. Processes copper-weld and non-ferrous metals. Adaptable for combined shaving and drawing.*

WET CONTINUOUS FINE WIRE DRAWING MACHINE—*Produces wire as fine as .008" from maximum entering gauge of .090" in high or low carbon steel wire, non-ferrous materials or their alloys.*



4 BLOCK HORIZONTAL "TROLLROD" MACHINE *for all non-ferrous metals, heavy rod drawing, round or shaped trolley wire manufacture.*



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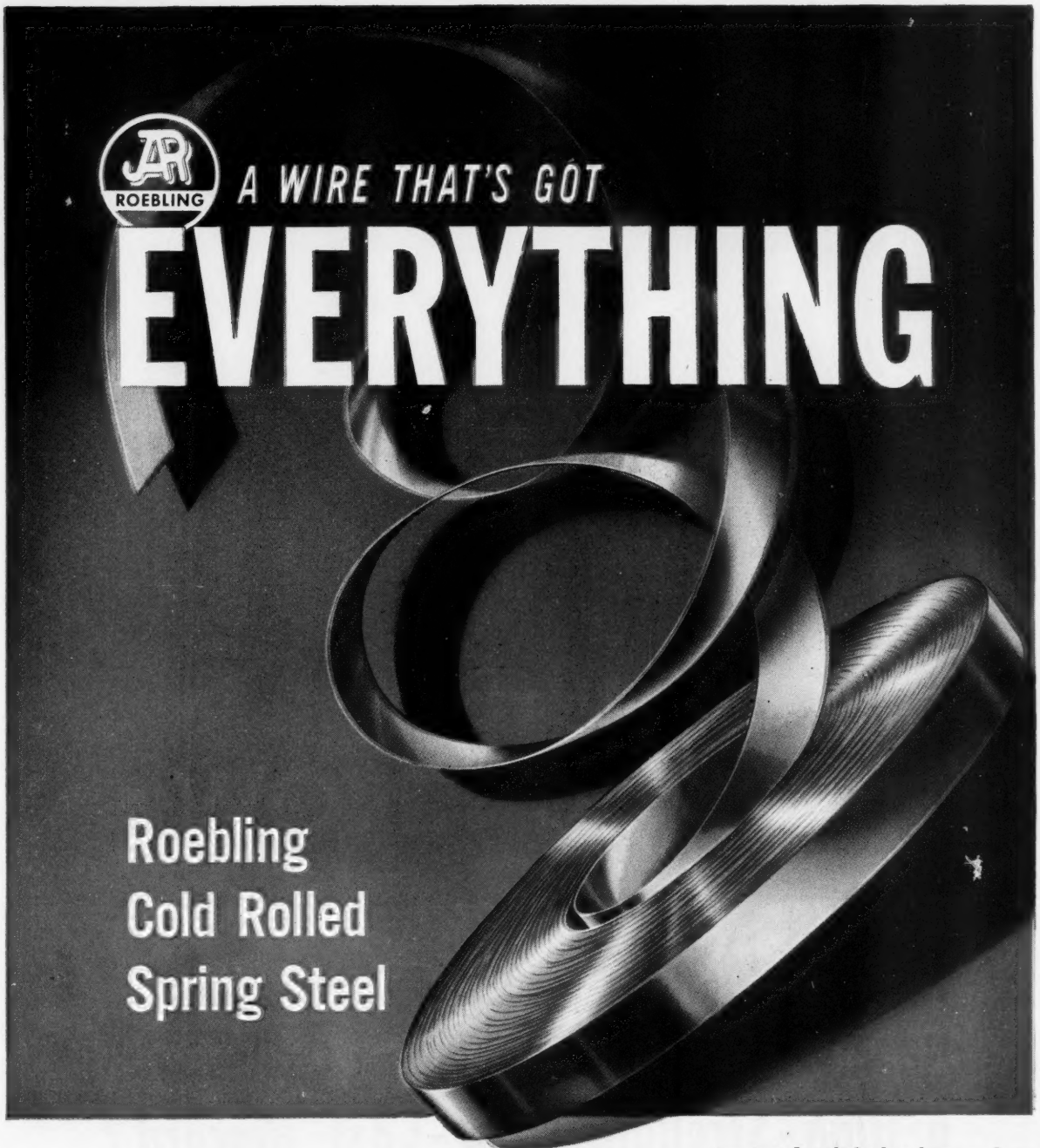

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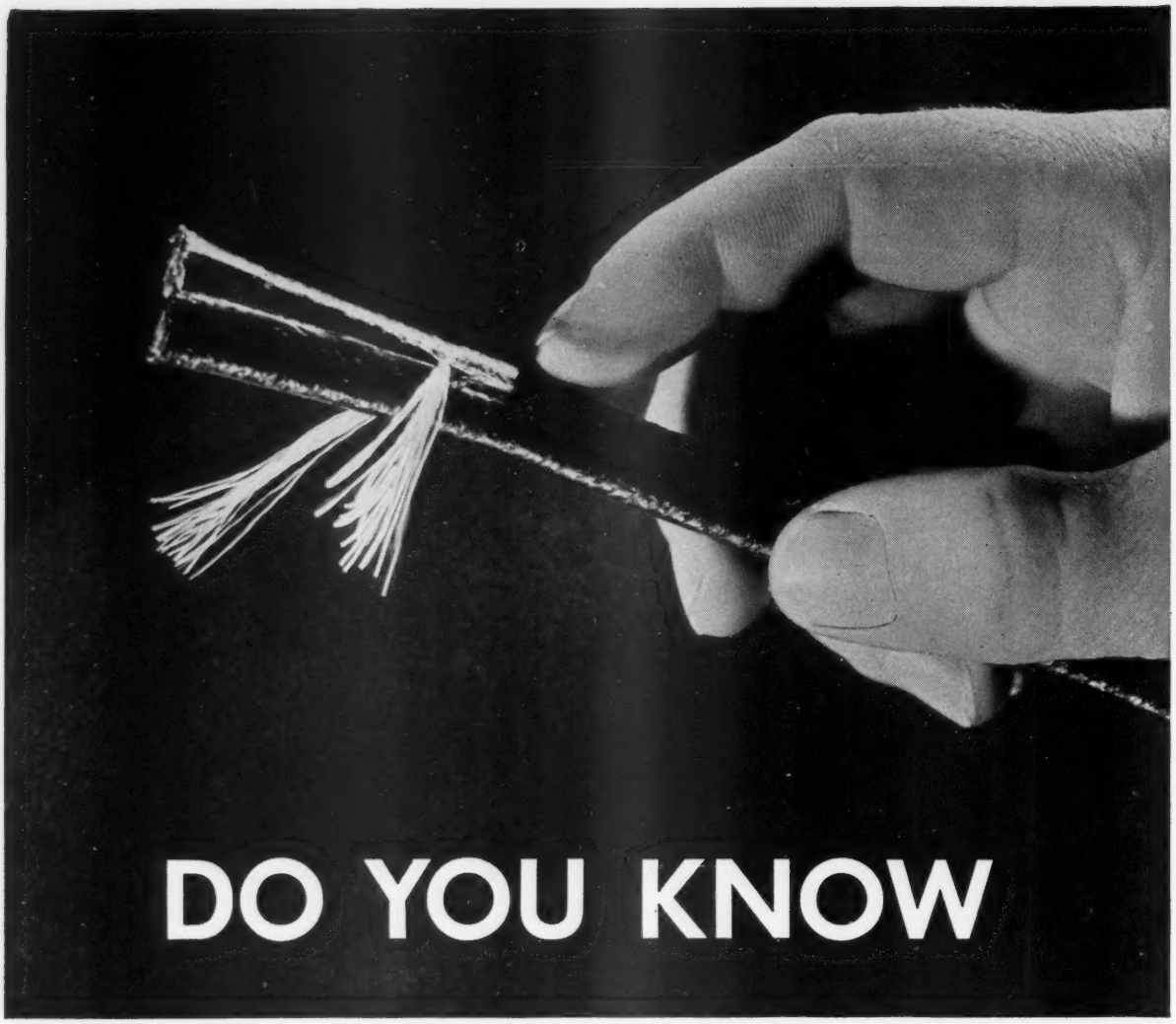

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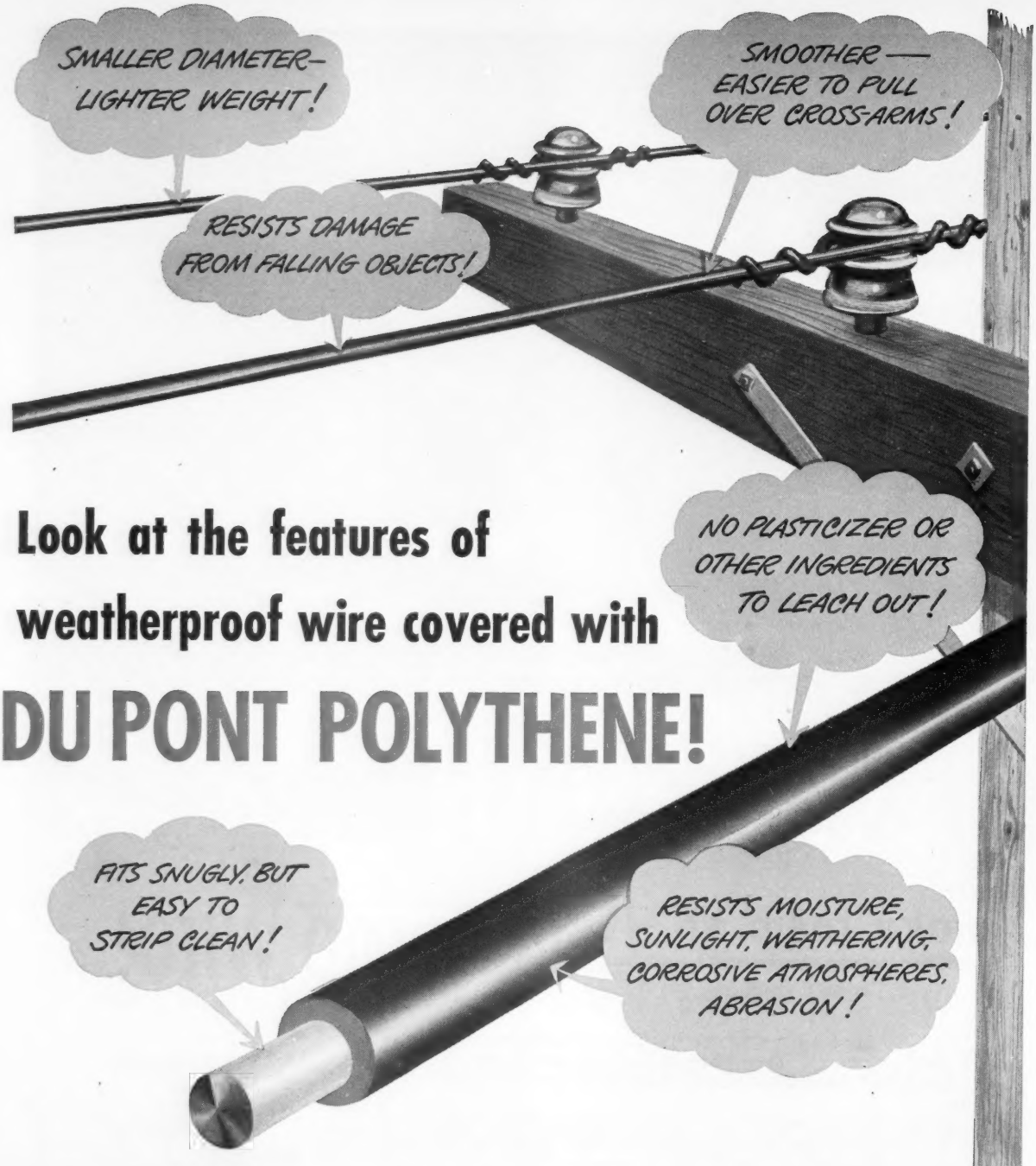
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

UNITED STATES STEEL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Uniformly high quality—superior finish—size accuracy—larger yield of finished wire—minimum man-hour and machine-hour loss because of less down-time.

A *Firthaloy* Service Engineer is available to help you get the maximum from *Firthaloy* Dies.

R-172

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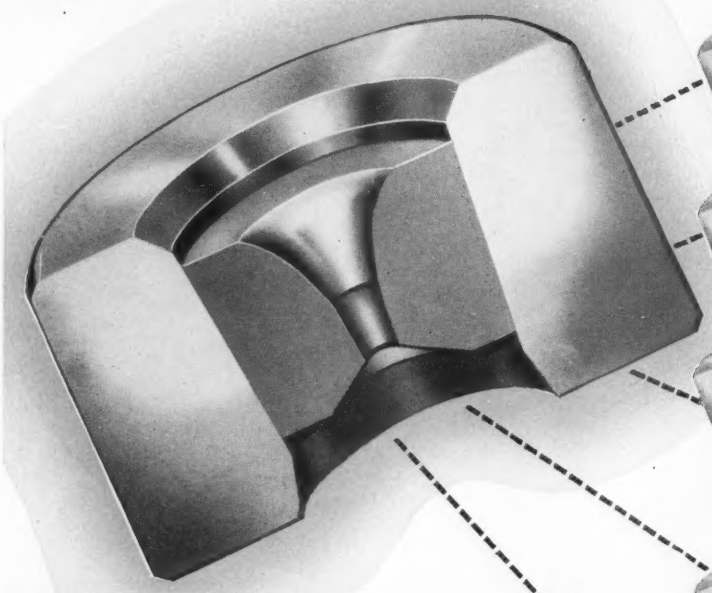
NOT *One* but *Five* FIRSTS
make V-R Carbide Dies Foremost in industry!



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The Wire Outlook

It is encouraging to note the many evidences that business has started to become more active. There are still many economists and business men who believe that the readjustment process has not been completed and that 1950 will see a further settling down of prices.

However, with the national debt remaining substantially unreduced, with large Federal expenditures continuing undiminished, with the pressure constant for higher wages and labor benefits, it is hard to see how we can readjust to a lower level, unless it is brought about by an economic debacle. The forces, natural and artificial, tend toward gradual increase in both prices and business volume. Within the trend there may be ups and downs.

The sequence of economic events since the war has been natural—a pent-up demand for goods breaking loose and bidding up prices; a large portion of the profits of business retained for increased production; increased production satisfying the most urgent demand; price declines; hesitation in buying because of anticipated lower prices; caution on inventories; production falling below consumption; and inventories becoming critically low. These inventories are now being built up, with corresponding better business all along the line.

Steel production is gradually being stepped up. Buyer pressure for lower prices is giving place to emphasis on deliveries; inventories are increasing, but hand-to-mouth buying will be continued for some time and prices will tend to increase gradually. They are not likely to get out of hand again, though.

Almost to the bottom of the recession, the Administration continued to talk about ways of stemming inflation. The turn has come; the Administration now discusses ways of checking deflation through inflationary spending and deficit financing, and this now seems pretty well set as a Government policy for the next four years. This will have an effect at this time both undesired and unneeded, but like the poor, we seem to have New (or Fair) Deal muddle-headedness and demagoguery always with us.

In the wire field there has been some up-turn in the demand for manufacturers' wire and on most types fairly prompt deliveries can be secured. Nail sales, in response to the heavy building demand, have jumped, but the supply is good. Wire formers report greater activity, the bedding industry is better and wool wire manufacturers are doing well. Automotive wire, of course, continues in high demand. While the volume of wire sales is not as high as our mills would like to see, summer vacation shut-downs curtailed production and fitted into the summer slackness conveniently. Vacations are over and the trend is in the right direction, both production and consumption-wise.

With building construction in July up 4% over June to $1,900,000,000, employment again at an approximate 60,000,000 level and manufacturers' sales $400,000,000 up over June, it looks as though we are on our way once more to better business. About ten years ago the national income was less than $100,000,000,000. In 1948 it was $225,000,000,000. We do not need a forced inflation. It can only create a false sense of prosperity. From this point on we are in need of a natural development stemming primarily from business itself, without the inflationary stimulus of deficit financing.

Next month wire men from every part of the United States as well as from many parts of the world will foregather at Chicago, Illinois, for their annual Convention. Opportunities to compare notes with competitors, customers, and suppliers will be offered, and everyone who can should attend. We shall hope to see you then.

—from the Editor's Desk

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A highly efficient cooling system by air inside and outside the block with extended time delay between drafts . . .

Reduces Cost!

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One modern MORGAN-CONNOR will do two or more times the work of some machines now in operation.

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Modern MORGAN-CONNORS enable a man to turn out 5 or more times his production of a few years ago.

Reduces Cost!

Prepare now for stiffer competition. Let us send you more information about these modern, efficient machines.

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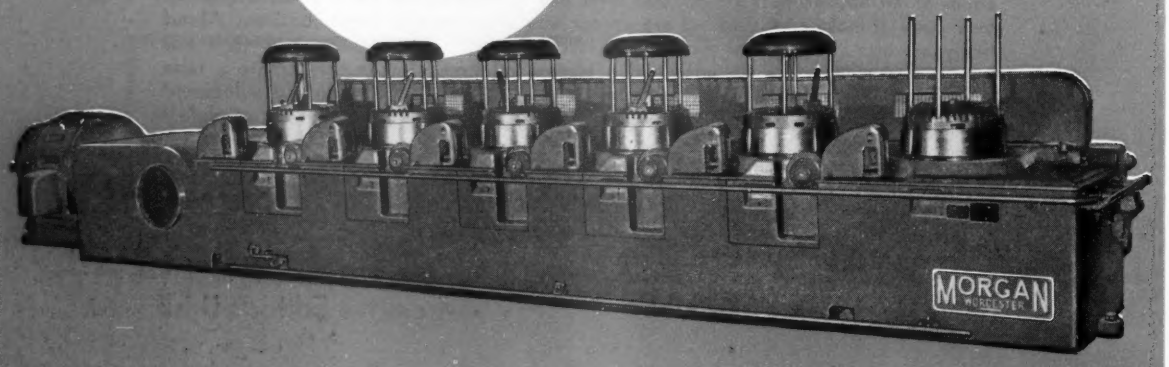

MORGAN CONSTRUCTION COMPANY, Worcester, Massachusetts

WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable.

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 24 SEPTEMBER, 1949 No. 9

Designated as

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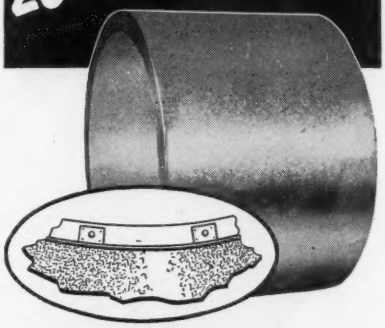
Extra service
and
20% less weight



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for wire and cable

. . . have extra strength where it is needed most—at bolt holes and base of the flange. This reinforcing makes possible the use of lighter gauge steel, saving up to 20% in weight while increasing overall strength.

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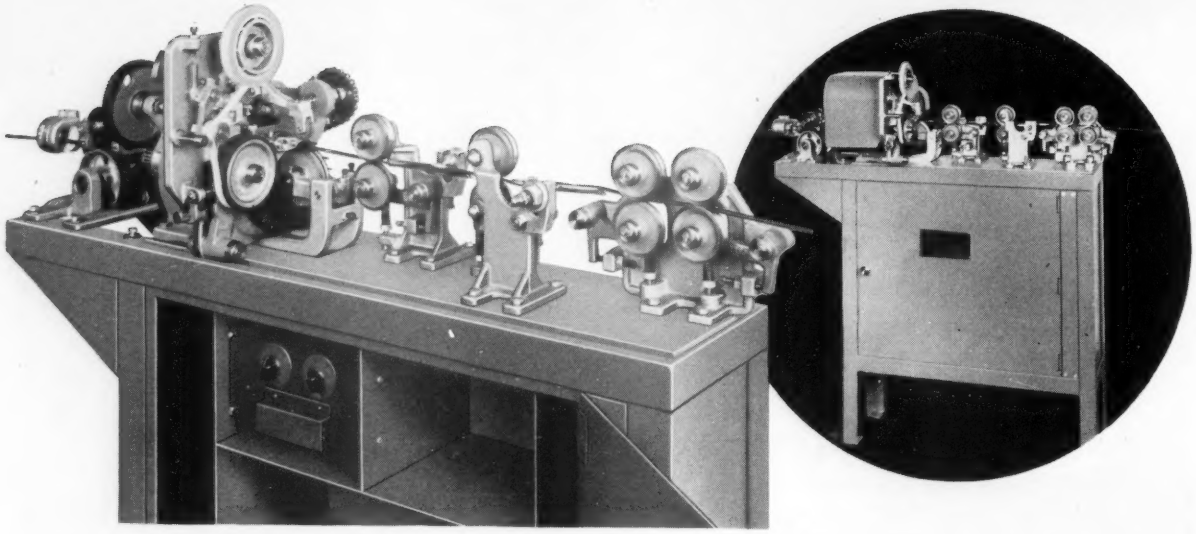
For Labelling Power Supply Cords and Cord Sets



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A monthly publication devoted to the production of Wire, Rod and Strip.
DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 24 SEPTEMBER, 1949 No. 9

Bethlehem Steel Company

CAMBRIA, JOHNSTOWN, SPARROWS POINT

By Kenneth B. Lewis

Consulting Wire Mill Engineer
Worcester, Mass.

CHARLES M. SCHWAB, from the time he took over the **Bethlehem Iron Co.**, always wanted a wire mill. Heaven only knows why; they are nothing but a headache; just write it off as one of those lapses in judgment that affect the wisest of men. When I was perspiring in the Lehigh Valley in 1905, as second assistant to the man at the bottom, word flashed around on the grapevine that we were going to make wire. We never did. Years later I learned from **Earle Douglas**, a wire man in the third generation, that Mr. Schwab had sent him out through the country to size up the current demand and sniff for plans and prospects. Earle reported back that Cambria and J&L were both going in, and Mr. Schwab sighed and said he wouldn't bother them; they would saturate the market. A couple of years later, having noted that the product of these two sank into the hungry market like water into desert sand, he sent Earle out again. Earle came back with the rumor that J&L was going to double the rod and wire output, and that Dominion was coming in again. Another sigh from Mr. Schwab.

* * *

CHARLES M. SCHWAB was a hard man to head off. He got his wire mill, though he had to buy **Cambria Steel Co.** to get it. Then he picked up a little bolt wire job when he took **American Iron & Steel Mfg. Co.** at Lebanon, and later built the big mill at Sparrows Point. **Bethlehem** also took over **Williamsport Wire Rope Co.** but I shall not attempt to cover that unit in this account of Bethlehem wire enterprises; it is big enough

Figure 1—Rod and Wire Mill—Johnstown Plant—1949.

Equipment Used at Johnstown, Pa. Plant of Bethlehem Steel Company In 1911 When Mill Was Built

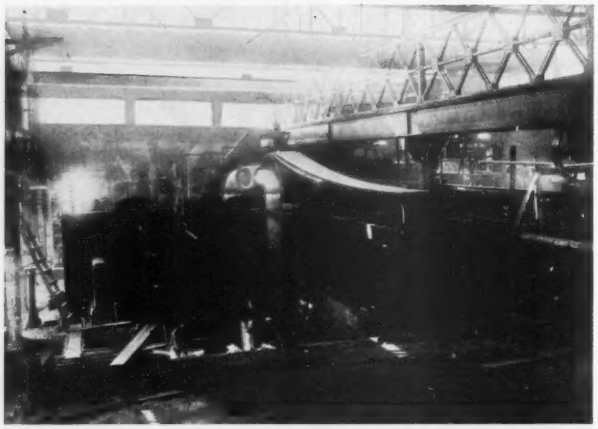

Figure 2—Steam Engines for Motive Power. * * * *

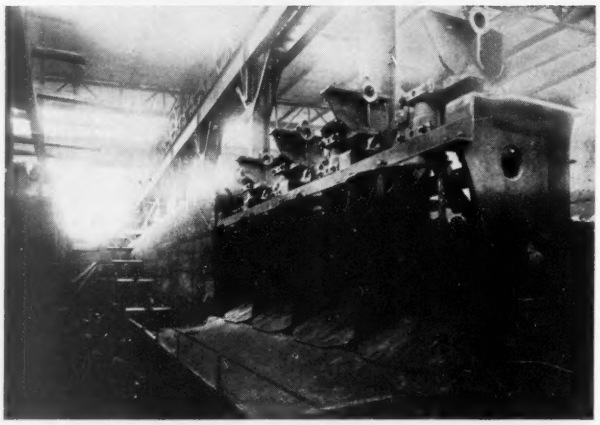

Figure 3—Dropping Coils on Rod Mill Conveyor. * * * *

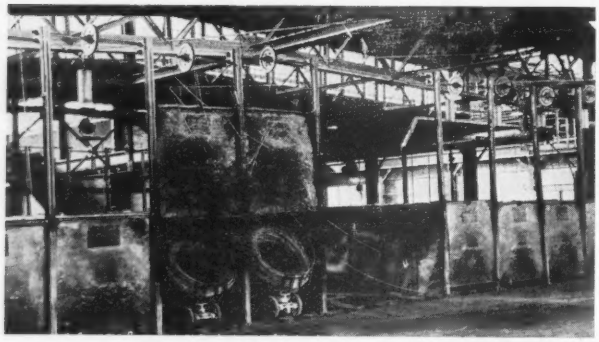

Figure 4—Old Bakers in Rod and Wire Mill. * * * *

Figure 5—Wire Drawing Units. * * * * * *

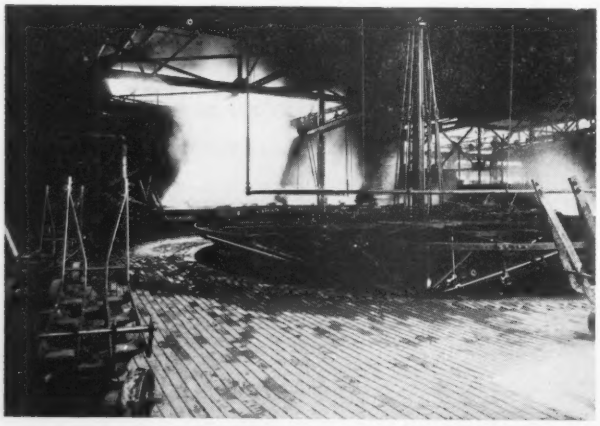

Figure 6—Pickling Vats. * * * * * *

Figure 7—Wire Drawing Room. * * * * * *

and interesting enough to stand alone, and I shall treat it alone if I can get the data. This article will trace the fortunes of the two big tonnage mills, **Johnstown** and **Sparrows Point.**

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I KNEW perfectly well that the roots of the Johnstown wire enterprise went very deep. When I first joined Morgan Construction Co. and began to check on their past wire machinery accounts I ran across photos of old benches labeled **"for Cambria Iron Co."** and I had seen somewhere a reference to Cambria's position in the early squabbles over barbed wire patents. I started ploughing through the ads in old magazines, farm journals, technical journals and the like, and sure enough, in the eighteen eighties I found their ads for fence, for wire, rake teeth, finger bars, wagon tires, and similar products of the rod and small merchant mill. I also found an ex-

cellent description of Edison's newly patented phonograph, and the news that the Republican Convention had nominated Benjamin Harrison for president!

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WHILE I was skipping from clue to clue, a seed previously planted suddenly bore fruit; I got from Bethlehem a fairly full story of the early wire project at Johnstown. This account solved a little problem that had gnawed at my sub-conscious mind for decades; why certain merchant mills at Johnstown were always referred to, regardless of their character or product, as **"Gautier Mills."** Here is the story:

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IN a pamphlet published by the company on the occasion of the Centennial Exposition in 1876, Cambria Iron Co. said: "Mindful of the importance of extending the use of Bessemer steel, the company is preparing to place a portion of its product upon the market in the form of wire, screws, and other articles for which Bessemer steel is better suited than iron." Bessemer steel was a new product in this country, and Cambria had been among the pioneers in its commercial development. Visitors to the company's office in Johnstown can hardly have missed that old converter shell mounted in the lobby, with its inscription.

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PURSUANT to this determination, the company made arrangements with **Dr. J. H. Gautier** to transplant his enterprise, **"D. G. Gautier & Co.,"** from Jersey City to Johnstown, and a new partnership was formed as **The Gautier Steel Co. Ltd.** The new partnership started May first 1878, and by the terms of its charter was to continue twenty years unless sooner dissolved. Capital was $300,000, officers **D. G. Gautier, D. J. Morrell,** and **Chas. Douglas.**

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THE mills were built in a district known as The Island, a little industrial suburb which had grown up in the days of the canal traffic. This old Pennsylvania Canal was linked to the history of Cambria by so many ties as to make it worth while to digress for a few paragraphs and sketch its story.

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IN the eighteen twentys, before the advent of the iron horse, the magic word was "canal." The Ohio and Mississippi valleys were ours at last, and population was flowing toward them. The war of 1812 had quickened the pulse of our feeble manufacturing enterprises along the seaboard, raw materials were flowing from the west, and manufactured goods moving in to pay for them, in a word, traffic was ceasing to be a matter of coasting voyages and had gone inland.

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THIS traffic was first by pack horse, and enormously costly, then by road, if that word can be applied to the appalling stretches of corduroy and bog over which springless carts groaned and pitched, and which was bordered by the carcasses of foundered and broken-legged horses. The road traffic was only slightly less costly than the pack horse. The Whiskey Rebellion was the westerners' revolt against high transportation costs; they couldn't ship out grain on horses, but they could ship its essence, whiskey, and make a profit, but only by neglecting to pay the duty on distilled liquors levied by our first Congress.

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INTO this picture stepped the Erie Canal, which promised to tap the resources of the immense Great Lakes region and all lands on their tributary streams. A project was broached to canalize the Beaver, link it with some small north-bound stream near Ashtabula, and add the immense Mississippi empire to the hinterland of the Port of New York. The merchants of Philadelphia were fit to be tied; they stood to lose not merely the putative commerce of the Great West, but even the actual commerce of their own state!

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SURVEYS were made, inventors and promoters consulted, the subscription lists went 'round, and in no time at all there was a water route between Pittsburgh and the sea, one which never crossed the state line. Horse-drawn cars on rails left Philadelphia carrying sectional canal boats. At Columbia the cars were lowered down a slope

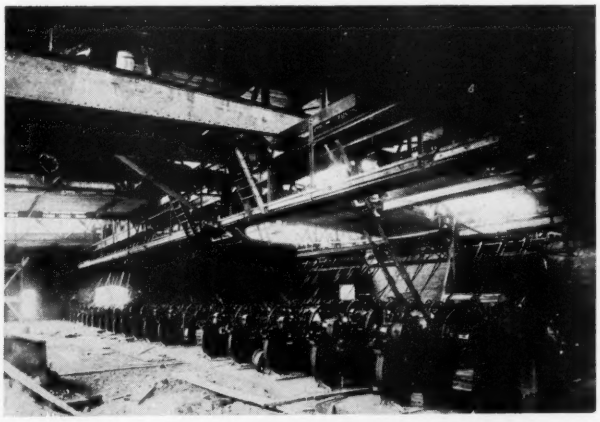

Figure 8—Nail Mill—Johnstown Plant—1911. * * * *

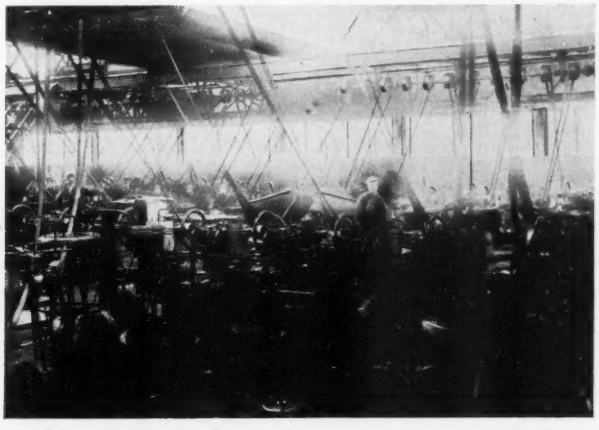

Figure 9—Barbed Wire Machines—1911. * * * * *

into the Susquehanna until the sections floated off, then they were linked up, hooked to mules on a tow-path along the east bank, and started north. At Middletown they crossed the river by way of Duncan's Island, and continued northward to the mouth of the Juniata, up which they proceeded to Holidaysburg, at the foot of the watershed. To make this 172 miles required 33 aqueducts and 111 locks!

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THE trip over the watershed was really something to marvel at. The Allegheny Portage Railroad handled this chore. It ran its cars into the water, centered the barge sections, hauled them out, and then made the 1398 foot lift to Blair's Gap, ten miles distant, in five lifts, called "planes." Steam engines and winches with enormous hemp cables stood at the head of each plane. (Roebling substituted wire rope in 1842.) Between planes the ground was levelled off in stretches of about two miles each, and horses drew the cars to the next hitch. A sumptuous tavern at the summit ministered to the intrepid travellers, and put up for the night all whose nerves had been shakened by the dizzy speed, or affected by the altitude.

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BEYOND Blair's Gap there were five planes in a total of twenty miles for a drop of 1172 feet to Johnstown, where the cars were again eased into the water and the canal barges floated free, to descend the Conemaugh and Kiskiminetas to the Allegheny, and to Pittsburgh, the Ohio, and all points west. The level spot where the transfer took place, "The Island" referred to above, soon became a busy hive of commerce, small manufacture, brokerage, service, and the like, and it was here that **Cambria,** years after the canal was but a memory, set up the **Gautier Steel Works.**

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THE Directory of the **American Iron & Steel Association** of 1878 lists 12 heating furnaces, 2 hammers, and 8 stands of rolls, 2-20″, 4-12″ and 2-9″. Not a word about wire machinery; it never got any publicity those days. Annual capacity was 30,000 tons.

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THE next year **Cambria** built open-hearth furnaces; business boomed, capital was increased to $500,000, and almost at once it was seen that expansion was essential. **Dr. Gautier** was well advanced in years and wanted to retire, so the partnership was dissolved and the assets sold to **Cambria Iron Co.** The new name of the project was **"The Gautier Steel Department of the Cambria Iron Co."** and the name **Gautier** has stuck to that group of rolling mills to this day. By 1888 the wire mill had grown to fill a building 500 x 200 feet, and in an adjoining building 256 x 50 was made the celebrated **"Cambria Link"** barbed fence.

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AS we swing into the year 1889 we find another tie between **Cambria** and the old Pennsylvania Canal, an episode whose mention will thrill with a twinge of horror all my elderly readers. I refer to the Johnstown Flood. The canal had long since passed into history; it had hardly got well established before the Pennsylvania Railroad threatened it, bought it, and junked it. But in its brief hey-day the owners had built a dam on the South Fork in the hills back of Johnstown and backed up a good sized lake to get water for the Conemaugh locks. After years of idleness it passed into possession of a fish-and-game club, whose members raised the dam somewhat, and built hunting lodges along the lake shore.

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MAY 1889 was a very wet month in Johnstown. The town was at the focal point of a number of mountain streams running in steep-walled valleys, and had had so many floods that the people were not easily scared, and when experts without authority warned that the dam on South Fork was shaky and besought the Johnstowners to move up into higher ground, the latter, already splashing around in rubber boots, paid no heed. On the afternoon of the 31st, **Johnny Baker** mounted his horse at the little hamlet of South Fork and rode up to have a look at the dam. As he came around a curve a few hundred yards below the dam he saw it start to crumble. He spurred his horse down the valley yelling the news, and may have saved a few lives, but the twenty foot wall of water soon passed him and hit Johnstown unannounced.

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TWO of the three bridges over the Conemaugh went down; the third held, and against it there piled up a churning mass of trees, houses, splintered timbers, animals, and human remains which rolled slowly over and over with a ghastly grinding sound. A tank car of petroleum was upset into this melange; a stove touched it off, flames heightened the horror of the scene, as the swimmers who had found haven in precarious perches among the debris were

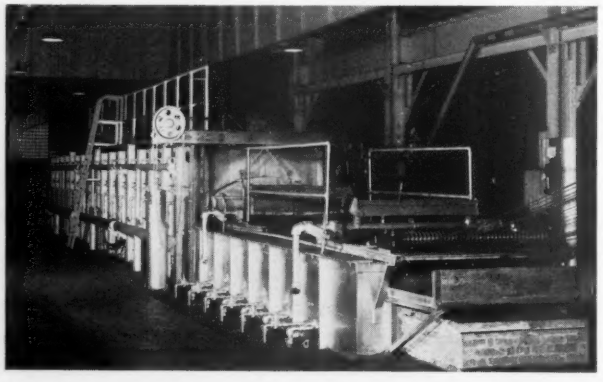

Figure 10—New Patenting Furnace—Johnstown—1949. * * *

forced to choose whether to be crushed, roasted, or drowned.

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IT is estimated that 2,200 people perished in this disaster. The true figure could not be learned, as many victims, crazed by suffering and losses, simply wandered away and could not be accounted for. A thrill of horror passed around the civilized world. I recall that even the stately London Times, bitterly contemptuous of everything sensational, and anything American, vouchsaved it a wee paragraph under the grudging headline "DISTRESSING AMERICAN INCIDENT."

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OF the **Gautier** department nothing remained but some of the deep foundations and a few of the heavier castings of the roll trains. Just what had been in the wire mill I cannot find out, but I know that four **Morgan** benches had been unloaded from cars and were about to be rolled inside, two rod and two eleven frames. Three of these units were probably in the churning mass at the bridge; the fourth turned up several miles downstream, wrapped around a tree stump. The wire mill was never rebuilt on the old site; the wire business lapsed for twenty years.

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THE new wire mill, the one we know, was under construction from 1909 to 1911 on its present site, the first rods coming off the mill Feb. 15, 1911. There was a straight continuous 16-stand **Morgan** rod mill, the orthodox cleaning circle of that era, **Humphrey** bakers, the usual layout of **Turner, Vaughn,** and **Taylor** rod frames, long spindle, described only as "one single and four double lines," which probably means a couple of hundred blocks, a nail department, bale tie machines, three galvanizing lines, 30 barb fence machines, and machines for field fence and poultry netting. These last were the product of **John Holmquist,** who became quite well known for his developments in similar lines, and who later set up **Jones & Laughlin** in the fence business. He is still living, I hope and believe, at 103 Major St. in Woodlawn, (Aliquippa if you insist,) and his designs have passed into commerce under the sponsorship of **Wean Engineering Co.**

★ ★ ★

THE wire mill settled down to a placid life of the sort typical of its time and position in the industry. It was the day of the "common product" and tonnage was the watchword. How simple was life in those distant days! Rods were oval, square, or star-shaped, but nobody cared much. Nails were often round in the shank, the spelter generally stuck onto the barb wire long enough for the jobber to get it sold, and what the superintendent worried about it is hard now to figure out. The superintendent, by the way, was **John Lonngren,** previously of Donora and Pueblo, a man who, I think, came up through the office rather than the mill. He left soon, and later started up the Tata wire mill in India.

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LONNGREN was succeeded in 1912 by **Dwight Muckley,** who had come from **Page Woven Wire Fence Co.** in Monessen, and both had as assistant **Harry Phillips,** who had superintended the construction of the plant. **Muckley,** a widely known wire man, was shifted to the **Gautier** mills in 1920; in 1928 he went to Pueblo, where he guided rod and wire affairs until his very recent retirement. When **Muckley** was shifted, **Harry Phillips** stepped in behind him, and in 1925 when he lost **Jack Mordica,** took on **Clifford Ward** as assistant. **Phillips** moved on in 1939, **Ward** succeeding. Clif was an early and active member of the WIRE ASSOCIATION, and his death two years ago was keenly felt by a large circle of friends. **Thomas C. Kern** has succeeded.

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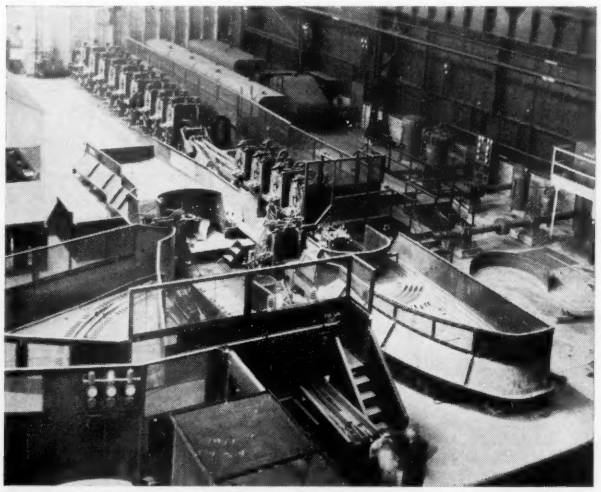

Figure 11—No. 2 Rod and Wire Mill at Sparrows Point, Md. Billet Heating Furnaces in Background and Looping Pass in Foreground. * *

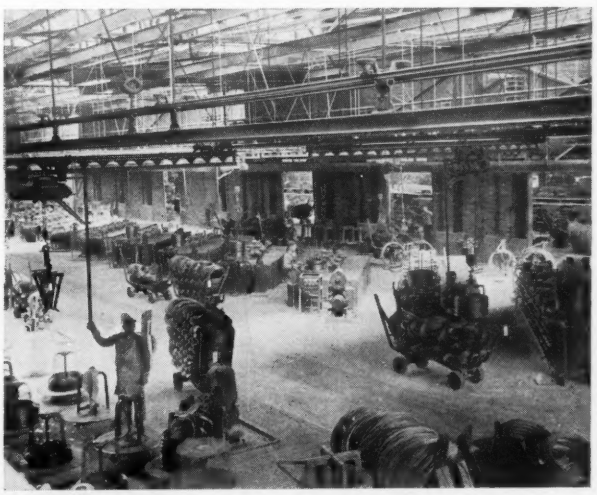

Figure 12—Wire Drawing Section in No. 1 Rod and Wire Mill at Sparrows Point, Md. * * * * * * *

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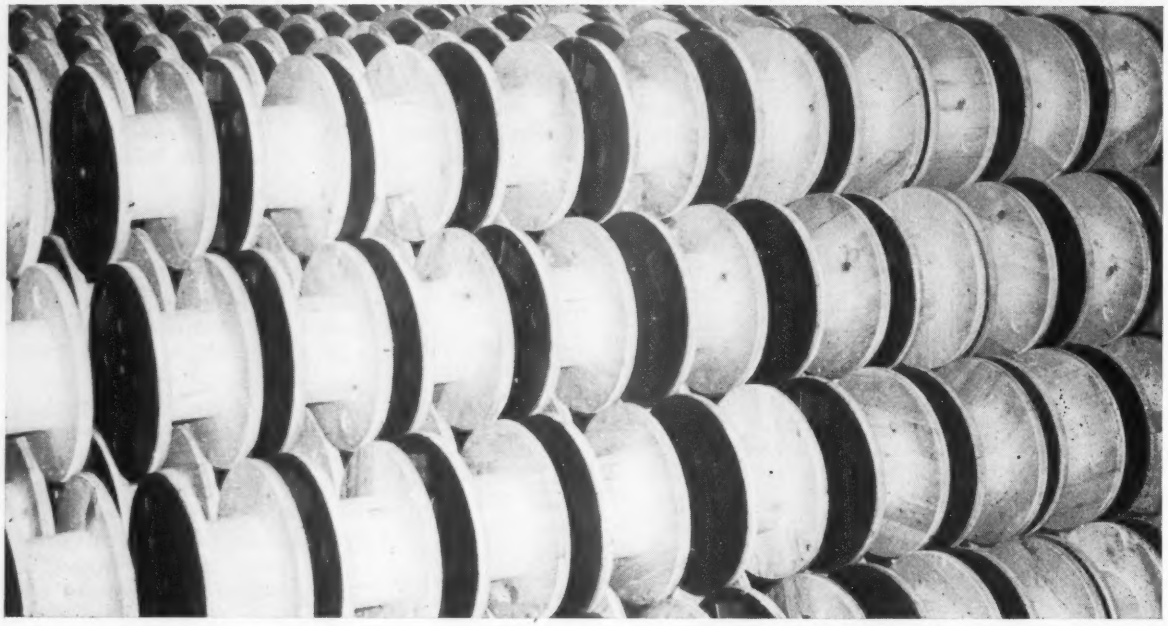

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Cubical Granules

By B. A. Stiratelli, Dev. Engr.
B. F. Goodrich Company
Cleveland, Ohio

The growing demand for higher speeds in the plastic coating of electric conductors makes the development described here one of timely interest.

INCREASED output with no sacrifice in quality is a primary objective of extruders of thermoplastic insulation and cable jacketing. A recent important step in this direction has been made with the introduction of Geon polyvinyl chloride compounds in the form of cubical granules. The principal difference between the new cubes and the old type granules is the uniformity of size and shape possessed by the new product. Their size is somewhat larger than the average of the old type granule—which varied considerably — and being uniform, the possibility of fines is eliminated.

★ ★ ★

THE advantages to be gained in using this new type of granules have been recently observed in field tests in which several standard wire insulation and cable jacketing compounds were studied under a variety of conditions in different commercial extruders. The observations made were consistent and therefore are believed reliable.

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ESSENTIALLY, the uniformity of size and the cubical shape

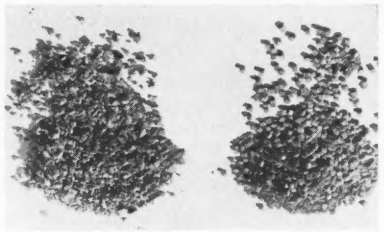

Figure 1—Cubical Granules. * * *

of the new granules imparted properties not obtainable with the old non-uniform granules. One of these properties is less variation in feeding onto the screw due to uniformity of the cubical granules. Another is faster feeding because of better packing of the larger, compact cubes. Porosity which is sometimes caused by the entrapped air in non-uniform granules, is minimized. All of these contributed to a smooth even flow along the screw. Complete, uniform heating of the thermoplastic was thereby attained. As a consequence, increased output resulting in a faster extrusion speed and better maintenance of gauge was achieved.

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THE substantial improvement in extrusion speed inherent with cubical granules, both as a 1/32″ wall over No. 18 AWG stranded wire, and as a jacket on a 72 ohm coaxial type cable, is illustrated in Figure 2. The effect of cubical granulation was especially noticeable in the extrusion of small diameter wire. Here a substantial increase of wire speed of 75% was recorded with the new cubes. The increase in the extrusion rate of cable jacketing was an appreciable 30%.

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THIS increase in speed was accompanied by no measurable dimensional variation of the insulation. Meanwhile, with the old type granules, the diameter variation in certain runs averaged 7%. Excellent maintenance of diameter with the use of cubical granules was consistently experienced in all field trials.

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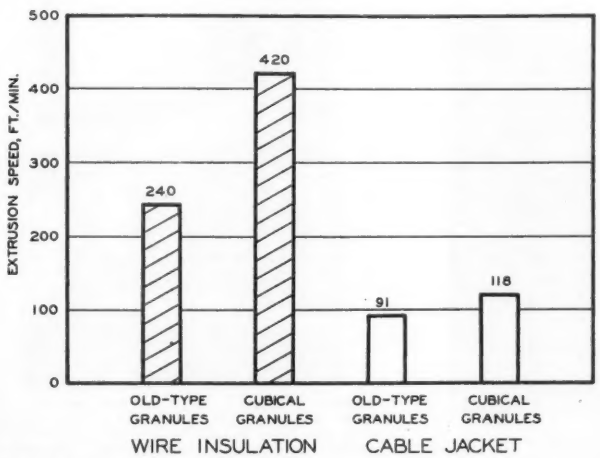

Figure 2—Cable Jacket. * * * * * * *

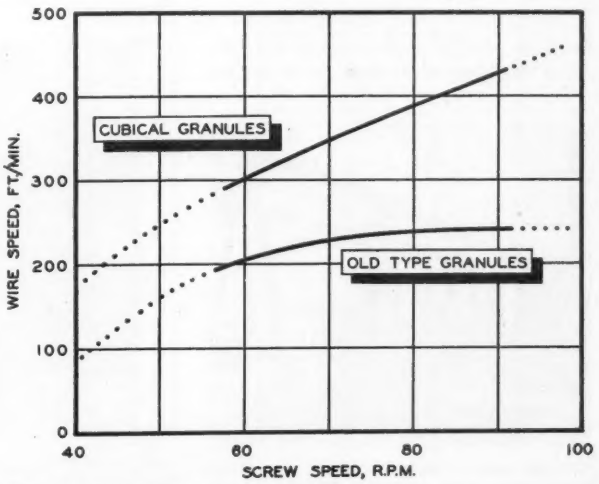

Figure 3—Speed Chart. * * * * * * *

Westinghouse Copper Wire Mill At Buffalo, New York

Part II

Part I of this article was published in the August, 1949 issue of Wire and Wire Products. See August page 687 for Flow Chart.

Enameling Round Wire

SPOOLS of round wire which have been drawn to size, are placed on wooden pallets and moved to the enameling department (See L on Flow Chart) by an electric fork truck. The enameling department is a single room, completely walled in and heated to maintain a constant room temperature of approximately 80°F. It is 200 feet long by 100 feet wide, with about 50 feet between the floor and ceiling. Housed in the enameling room are a total of 68 enameling machines or towers. These range in size from the small type used for 0.0025" diameter wire up to the largest which is used for 0.102" diameter wire.

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ALL exhaust equipment for the removal of fumes is located on balconies above each bank of enameling machines and the exhaust ducts lead directly out through the roof. PR-2192 shows the exhaust ducts leading from one bank of enameling machines.

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EACH enameling tower consists of a payoff stand, a pre-annealer, a baking chamber, a capstan, and a take-up stand. One such tower is shown in PR-4796. A tower will simultaneously apply enamel insulation either to 12, 16, or 20 individual lines of wire.

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TO describe the operation, one line of wire will be followed through a tower. The supply spool is placed in the payoff stand, where it turns freely on roller bearings. The line of wire proceeds from this spool around a sheave to the pre-annealer where it is continuously annealed in a heated, Exogas protective atmosphere chamber. Water seals are used at both ends of the annealing chamber to prevent the escape of the inert gas which prevents oxidation. From the pre-annealer the wire goes to a sheave at the bottom of the baking chamber. This chamber is an upright, electrically heated oven, open at top and bottom for the entrance and exit of the wire.

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AN enamel applicator at the bottom of the oven, similar to the one shown in PR-4809, consists of a pan large enough to surround the group of sheaves at the bottom of the oven. Enamel is circulated through the applicator pan at a constant viscosity and temperature. As the wire passes under the sheaves it picks up a coating of enamel which is baked as it proceeds up through the oven. At the top of the oven are sheaves which reverse the direction of the wire and direct it downward to the applicator for another coating of enamel. Enameled wire may receive four, five, six, or more layers of enamel in this manner. After the wire has received its final coating of enamel, it goes around a capstan which supplies the force for pulling each line of wire through the complete operation.

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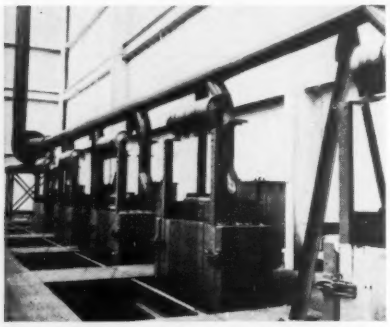
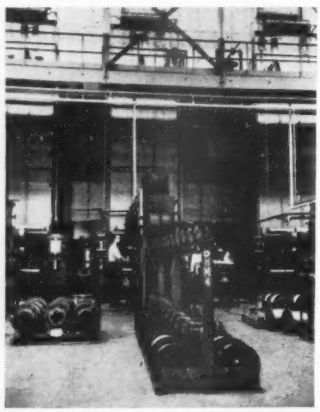
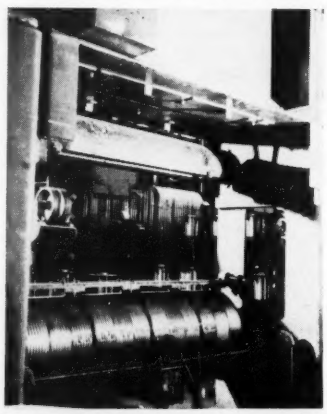
FROM the capstan the wire goes over a sheave and onto the finished-wire spools. Each spool is individually motor driven and is adjustable in speed so that the correct tension can be maintained be-



PR-2192—Exhaust ducts lead from a bank of round copper wire enameling machines directly out through the roof. * * * *



PR-4796—This enameling tower consists of a payoff stand, a pre-annealer, a baking chamber, an enamel applicator, and a drying oven. * *



PR-4809—A close-up view of the enamel applicator and the bottom of a drying oven, consisting of a pan large enough to surround the group of sheaves at the bottom of the oven. The enamel is maintained at a constant viscosity and temperature. * * * * *

tween the capstan and the spool to insure an evenly-filled, tightly-wound spool of wire. As each spool fills, it is changed without stopping the line of wire so that no spot in the wire will be overbaked in the oven. Likewise, when a spool of supply bare wire runs out, the wire from a new spool is brazed to the end of the wire from the empty spool without stopping or slowing the baking operation.

★ ★ ★

Enamels

THREE general types of enamel are used in the enameling department; conventional, synthetic, and Formvar. Each of these enamels is recirculated through the applicators at the towers from a central enamel mixing room. This room is located underground just outside the main building wall. It is reached through a tunnel from the enameling room. Enamel is received in tank cars from suppliers and pumped into 15,000-gallon storage tanks in the enamel mixing room. From there the enamel is drawn into blending vats which heat it and mix raw enamel with a solvent to bring it to the required temperature and viscosity. From these vats the enamel is pumped to the enameling towers where it flows into the applicator pans. Since evaporation of the solvent takes place in the applicator, viscosity is maintained by pumping an excess of enamel to each applicator and allowing this excess to return through an overflow pipe to the vat in the mixing room. Constant viscosity is maintained by an automatic sampling device located in the mixing room.

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WESTINGHOUSE conventional enameled wire is made from 3399-1 enamel which makes sizes No. 10 to No. 25, and 3399-3 enamel which makes sizes No. 26 to No. 42. Enamels 3399-1 and 3399-3 are drying oil-base varnishes. They are prepared by heating drying oils, such as linseed or china wood oil (tung oil), with a natural or synthetic modified resin until the desired viscosity is attained. The mixture is then cooled and diluted with a coal tar base solvent such as naptha. The enamels are more commonly applied to the wire by means of a dip procedure, although it is practicable to apply the enamel with dies or similar metering devices. For dip applications, the enamel is maintained at an average temperature about 10°C. higher than room temperature and at a viscosity of approximately 25 centipoises at approximately 25 percent solids. Die applications are not used at Westinghouse for this type of enamel, since existing equipment is designed for dip applications. Enamels 3399-1 or 3399-3 require a relatively high baking temperature, which necessitates low wire speeds through the baking oven.

1. **The enameled wire is used only in applications where the wire is not subjected to severe winding abuse and also where requirements for heat stability and solvent resistance are of minimum levels.**

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WESTINGHOUSE synthetic enameled wire is made from 8850-1 enamel, which is suitable to coat sizes No. 26 to No. 42 single thickness enameled wire, and 327K enamel which makes sizes No. 19 to No. 25 single thickness enameled wire.

1. **Materials 8850-1 and 327K are synthetic wire enamels which were developed to fill a long need for a varnish film with better thermal stability, higher abrasion resistance and, at the same time, able to be applied at high speeds in existing wire enameling towers without dies. The enamel has excellent resistance to all types of solvents used in insulating varnishes. This includes both the aromatic (coal tar type) and the petroleum solvents. The enamel also has excellent resistance to chlorinated aromatics (Inerteen) and transformer oil. The abrasion resistance of this enamel is superior to conventional enamels, but lower than double build (Formvar type) synthetic coatings when tested on standard abrasion testers used by the wire coating industry. (This comparison is made between double-build synthetic coatings and single build wire coated with 8850-1 enamel.) The thermal stability is one of the outstanding properties of this enamel. In the range of temperature from 150 to 250°C it exhibits several times the thermal stability of other synthetic wire coatings such as Formvar and nylon. Enamel 8850-1 generally can be applied at higher operating speeds than conventional enamels or other synthetic wire coatings.**
2. **The advantage of 1880-6, Westinghouse synthetic enameled wire (8850-1 and 327K insulation) are good thermal stability, good solvent resistance, and good winding properties such as abrasion resistance.**
3. **The disadvantages are that this type of enameled wire is not available in sizes larger than #18 AWG and that the bake must be carefully controlled to eliminate sensitivity to low humidities.**
4. **This type of enameled wire is excellent for transformers especially where chemical solvents are employed, for small motors which are machine wound, and for control apparatus coils where insulating varnish resistance is required.**

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MATERIAL 3399-6 is the Westinghouse designation for polyvinyl acetyl type enamel (Formvar). The solutions of the resin are viscous (about 4500 centipoises and are low in solids about 15 percent). Consequently, the enamel must be applied by means of a die that applies a measured uniform coating of solution around the wire. At Westinghouse, 3399-6 enamel when coated on wire yields heavy single, triple, and quadruple Formvar which differ only in enamel thickness.

1. **Formvar enameled wire has several excellent properties which include high winding factor, good flexibility, satisfactory extensibility, excellent toughness, good dielectric strength and good solvent resistance. These properties make it relatively easy to maintain the integrity of the insulating film during winding, treatment and service.**
2. **The disadvantages of double Formvar enameled wire are that it has a poor space factor, a poor resistance to chlorinated solvents such as transformer Inerteen, and that it must be manufactured with dies, causing an additional operating variable which must be carefully controlled to maintain quality.**
3. **The Formvar type wire is ideal for use in motor winding where the wire is subjected to hard treatment. Other coils for control apparatus lend themselves for Formvar wire provided that sufficient space is available.**

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Enameling Room Fire Extinguishing System

AS in all enameling rooms, there is an ever present danger of fire, since the solvents in all enamels are highly inflammable. To give all possible protection to both operators and equipment, an automatic carbon dioxide fire extinguishing system has been installed.

A four-ton central station supplies carbon dioxide to each individual tower through a manually operated control, or to the entire enamel mixing room through automatic control.

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Other Insulation For Round Wire

ALTHOUGH most of the enameled wire is ready for winding into motors, transformers, or for other uses, a portion of it must receive a cotton yarn or paper tape covering for special applications. Adjoining the enameling room is a separately enclosed room which holds the cotton, paper and glass insulating equipment. (See M on Flow Chart). The machines themselves are similar to equipment used for cotton covering rectangular wire. They are smaller and more compact, however, since they accommodate smaller spools and apply insulation to small round wire.

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ONE of the main difficulties encountered in applying a cotton insulation to copper wire is the effect of low humidity upon the cotton yarn. Cotton yarn loses tensile strength as relative humidity becomes lower. For this reason, a controlled-humidity atmosphere is maintained in the textile insulating room and yarn multiplying room. This humidity control is maintained by an automatic monitoring device.

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Yarn Multiplying

COTTON yarn which is used for insulating both round and rectangular wire is purchased as single-strand yarn packaged in the familiar "cone" form. Before this yarn can be applied to wire, several strands or ends of yarn must be brought together and laid parallel to form a wide band of insulating yarn. For most yarn sizes, and for a mean wire size, from 12 to 18 ends of yarn are "multiplied" in this manner and put up on paperboard tubes. (See N on Flow Chart). Each ball of insulating yarn, thus multiplied, weighs approximately one pound and furnishes enough yarn to insulate approximately 50 pounds of copper wire.

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THE multiplying machines themselves consist of a rack for holding the cones of single end yarn, tension discs for maintaining an equal tension on each end as the several ends are being brought together, a pulley for gathering the ends together without a twist, and a spindle holding the tube for packaging. PR-4792 shows a view of this equipment. Each end of yarn passes through a finger which is held in an elevated position by the strength of the yarn. If one end of yarn breaks during multiplication, this finger falls and automatically stops that spindle. The broken yarn must be repaired before the operation can continue. This arrangement makes it possible to maintain production on several spindles at one time without the possibility of producing yarn with fewer ends than intended.

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Inspection

ALL enameled or textile covered wire is inspected as it is being produced. Any wire which is found to be defective is immediately taken off the machine, the necessary correction made, and a new spool started. In this manner, all wire is ready for packing as soon as it comes off the machines. Finished wire is stacked on pallets for delivery to the packing stations by an electric fork truck. A further sampling and testing operation is performed upon each pallet of wire. This consists of an abrasion or scrape test, dielectric strength test, fracture test, and elongation test.

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Packing, Storing and Shipping

EACH spool of wire is individually wrapped, weighed and labeled at the packing stations. Spools of 8-, 12-, and 16-inch diameter are re-stacked on pallets for storage in the warehouse (See O on Flow Chart). Smaller spools are packaged in cartons before being placed on pallets for storage.

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ALL shipments are made from warehouse stocks. The total net weight of wire on each pallet is plainly marked on the outside to simplify the shipping operation.

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PALLET loads of spools of the smaller sizes of wire are loaded in truck bodies or box cars by electric fork trucks. The larger spools of wire are placed directly upon the forks of an electric truck and individually loaded, as shown in PR-4795. The location of this operation is indicated as P on the Flow Chart.

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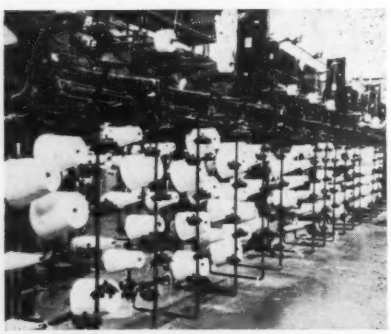
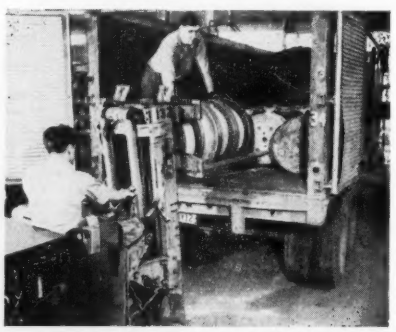
LOCATED over the textile insulating room and the yarn multiplying room is a balcony area, used for the storage and repair of empty wooden shipping spools which are returned from customers. Returned spools are unloaded on the floor below and placed on a power driven belt type conveyor which carries them to the balcony. This conveyor is shown in PR-4801. Here they are sorted and set aside for repair and removal of the

(*Please turn to page* 800)



PR-4792—An operator is shown at a bank of yarn-multiplying machines. The machines are used to combine single-strand yarn into a wide band of insulating yarn.



PR-4795—The larger spools of copper wire are placed directly upon the forks of an electric truck and individually loaded in a truck body.

The customer *ISN'T* always right!

THERE we go, starting an argument again, but let us give you the wire mill's side of the story.

Just because the wire mill follows the customer's specifications and sull coats his wire before drawing it, that doesn't mean that sull-coated wire is best for the customer's purpose. It just means that the customer doesn't *know* about Magnus Metalcoat #267.

And, when the customer specifies lime-coated wire on his orders because that has been the custom for more than a hundred years, it's because he doesn't *know* about Magnus Metalcoat #267.

The wire mills know about it, though! Time after time they've told us that they would *rather* supply their customer's wire coated and drawn with #267, because it is so clean—absolutely free from rust and lime streaks.

The wire mills know that rod and wire coated and drawn with Metalcoat #267 will simplify their customers' cleaning problems because they have a chemically clean surface to work with. For electroplating, tinning, copper coating or other liquor finishing, lacquering, galvanizing, welding—for any special finish operation—wire coated and drawn with #267 is far superior to any other.

But, unless *you*, the wire mill's customer, give them permission to fill your orders with wire coated with Metalcoat #267, they are stuck with the messy lime-coating method, and the expense of baking their rod and wire.

We'd like to be able to say, once more, "The customer is always right!" That's a good old American slogan, and it always applies where the customer *knows* what he is buying.

Would you like us to work out your problems with your supplier? Then send us the name of the wire mill which furnishes your wire. Or, on your next order, SPECIFY METALCOAT #267!

Metal Coating Division

MAGNUS CHEMICAL CO., INC.

Garwood New Jersey

Packaging Coiled Strip and Wire

by

Harold F. Jacobsen

Director of Packaging and Loading
American Steel and Wire Company
United States Steel Corporation Subsidiary
Cleveland, Ohio

A paper presented at the 1948 Series of Regional Technical Meetings of the AMERICAN IRON AND STEEL INSTITUTE. Published by Permission.

HANDLING and packaging finished products in recent years has been given much attention and developed into a highly specialized field. Packaging procedures correctly involve efficient material handling, bundling, protection against corrosion, wrapping, boxing, palletizing, tagging, marking and employing the proper method of loading and bracing for transportation.

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IN the Steel Industry, particularly, many changes have been made in order to take advantage of more efficient material handling devices and to improve packaging operations. Increased demand for steel calls for greater production and the installation of new equipment, in addition to the streamlining of the Finishing Department, and the introduction of mechanical devices for efficiently performing the various tasks involved. New plants built in recent years allow ample space for efficient warehousing and shipping; however, in older plants the increased tonnage usually has to be handled by the shipper on a smaller floor area than before. This was a job which was impossible without the help of mechanical equipment. Millions of dollars are being spent monthly by various companies to cover finishing expense, to pay for labor and material to handle and package their goods. Management has realized the importance of efficient handling and shipping, and has recognized the need of setting up a proper organization to control this important phase of operations.

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GENERALLY accepted estimates place the average cost of handling at 22% of all labor cost in industry. It has been estimated that approximately 80% of all unskilled labor in this country is employed in picking up material, moving it, and putting it down again. The Department of Commerce states that during 1946, Industry purchased five billion dollars worth of packaging material. I do not know whether a survey has been made as to how much money is being spent by the Steel Industry on packing and shipping expense; however, judging from the overall figures just mentioned, it must be a very large sum. I believe that no better words can express the importance of packaging and management's interest in packaging, than to quote from a speech which **A. E. Dodd**, President of the American Management Assoc., gave some time ago during the Annual Packaging Exposition. "Packaging is really a job of management, and the only way the job can be done right is to assign it to a properly qualified member of the executive staff who can give all his time to this work. There is a place in industry for men who are properly prepared for packaging work, men with education and experience, which qualifies them to carry on this work. Until this need is recognized more extensively by business organizations, and until training is provided so that properly qualified personnel is available for the average coordinating job, we shall fail to achieve the maximum benefits of good packaging."

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YOU know that there exist today a number of organizations which promote good packaging and material handling. Our educational institutions have recognized this fact and courses devoted to packaging engineering are offered at the Harvard Graduate School of Business, MIT, Pratt Institute, Wayne University, Western Reserve, University of Illinois, and many others. The Mellon Institute has set up a fellowship for the study of consumers' needs in the packaging field. Also, the desirability of endowing some universities with sufficient funds to establish courses in packaging engineering has been discussed.

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WHY do I mention all these things to you? For the simple purpose of trying to convey that the time of manual handling has passed and we are entering a new era of mechanical handling and packaging. Packaging and shipping activities are not considered an orphan or stepchild any longer—the child has grown up. Industry has given proper recognition to packaging engineering. We can be proud of the work accomplished so far and there are plenty of opportunities ahead further to improve facilities.

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NOW let me discuss with you packaging in the steel industry. I do not want to talk to you about heavy products, which subject is scheduled for discussion at one of the other of the Regional Technical Meetings. We all know that due to improved handling devices an ore carrier can today be unloaded at speeds of 1500 to well over 2500 tons per hour, while not too many

years ago ore was brought out of the hold of the boat with wheelbarrows. We know how ingots, billets, bars and sheets are handled in heavy lifts of five tons or more.

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TODAY I would like to discuss with you strip and wire packaging, the lightweight products of the industry. Through the efforts of the A.I.S.I. Packaging and Loading Committee, regular practices have been prepared and approved, setting up certain minimum requirements applicable to strip shipments. In preparing strip for shipment it is important to consider size, gauge and finish because these three factors determine type and weight of the package. Base packaging is to ship coils individually without protection. However, depending upon the three factors already mentioned, certain narrow width coils or special finishes are protected by either wrapping, platform packaging, or boxing.

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WRAPPING means wrapping a coil spirally with wrapping material, usually a creped kraft paper, asphalt laminated waterproof paper, burlap or reinforced combination paper. When machine wrapping coils the wrapping material is furnished in 8″ diameter rolls, approximately 4″ wide and is applied to the coil mechanically. Wrapping equipment can be purchased to accommodate almost any size from small coils of 8″ diameter to large coils of 60″ diameter. About 40 coils of approximately 200 lbs. each can be wrapped by machine in one hour. You can figure out yourself how long it would take to wrap the same coil by hand, not taking into consideration the much neater and appealing wrapping job of the machine-wrapped coil over the hand wrapped coil.

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PLATFORM PACKAGING means placing several coils either protected or unprotected in horizontal position on a skeleton deck platform consisting of 2 x 4 or 3 x 4 runners and several cross pieces. Depending upon size and gauge, approximately up to 8000 lbs. can be packed on platforms. The loaded unit is then transported to the car with fork lift trucks. Specialty strip such as razor blade steel or heddle steel, is packed on skeleton deck platforms each coil being separated from the other with chipboard; the whole unit, after being packed is protected by placing a plywood drum over it.

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BOXING is usually applied for light gauge narrow width steel of delicate finish as such flapper valve, polished knife blade, and band saw steels, to mention a few. Boxes may be paper lined or individual coils may be wrapped before packaging in containers.

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ANOTHER method of packaging is to secure a number of coils into a unit by tying them together with four straps. The completed unit of about 4 to 6 thousand lbs., is loaded into cars with a ram tractor. Handling of strip steel from bundling and inspection into cars is done today very efficiently. Some years ago, as you probably all remember, coils were loaded laboriously by hand or by chain hoist on a buggy. The buggy was pushed onto the loading platform, and coils then were taken off the buggy by hand and piled or nested in the car. It took a loading crew about 40-50 man hours to load a car while today the same material can be loaded by ram truck, using the cylinder method of four corner loading, in about three hours.

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WHEN loading coils on platforms a fork truck is used to pick up a unit of approximately 3 tons. Coils are loaded quickly, strapped into floating units in each end of the car and unloaded at destination by customers in a fraction of the time it formerly took to handle loose coils. Platform handling enables customer to stock material in his warehouse, one unit on top of the other, thus preserving valuable floor space. I believe there is no need to stress to you the dollars and cents value of the progress made today and the benefits being gained both by producer and consumer in applying mechanical means of handling. Individual labor rates are the highest they ever have been and in most every case where mechanical equipment can replace manual labor shipping costs can be reduced.

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WIRE PACKAGING, due to the many diversified products manufactured by the wire industry, may best be subdivided into the following groups:

1. **Merchant wire and wire products.**
2. **Manufacturers wire, including low and high carbon and alloy wire.**

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MERCHANT wire and wire products cover all such items as nails, tacks, brads, staples, fence, barbed wire, netting, bale ties, baling wire and merchant wire like stone wire, stove pipe wire and others. All these products are sold directly to the trade and used as received, in contrast to manufacturers wire which, as the name already indicates, is sold to manufacturing plants which form or produce a finished product from the wire; i.e., bolt wire, nut stock for the manufacture of bolts and nuts, spring wire for bed springs, chair cushions and davenports, mattress wire for mattress springs or weaving wire for screens. There are 1001 applications and it is not the purpose to count up all the uses to which wire is put. However, it is important for the shipper to know destination, distance of travel and ultimate use of the wire in order to pack material correctly and assure arrival at destination in as good condition as the day it left the mill. Many items produced can be shipped without any protection whatsoever; this is true of such items as galvanized wire in coils, barbed wire on spools, fence or netting.

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WHEN shipping **coiled wire** the determining factor as regards method of packaging is finish, gauge and coil diameter.

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(*Please turn to page* 788)

ON TO CHICAGO ! !

for a GREAT EVENT, a GOOD TIME and a PROFITABLE FOUR DAYS:

THE WIRE ASSOCIATION ANNUAL CONVENTION

OCTOBER 17-21, 1949, INCLUSIVE, LA SALLE HOTEL

As a wire man, which includes our suppliers, your attendance at and participation in the meetings and functions of this Convention will contribute much to its success. A big meeting is indicated. You can't afford to miss it—technical papers of unusual merit, old friends to see and new people you should get to know. Here's the program:

PAPERS COVERING:

Handling Wire and Wire Products in the Wire Mill
Plastic Strain and Hysteresis in Drawn Steel Wire
Back Pull Wire Drawing
Continuous Cleaning
Processing of Stainless Steel Wire
Symposium on Carbide Dies
Symposium on Diamond Dies
Wire Welding

Protective Atmospheres for Annealing Non-Ferrous Wires
The New General Electric Company Copper Mill
The Manufacture of Nickel and Monel Wires
Application of Tin Coating in the Wire Industry
Nylon Insulation

PLANT INSPECTION: Visit to Joliet Mill, American Steel and Wire Company.
Tuesday, October 18 — 8:30 A. M.

FUNCTIONS: Annual Luncheon, at which the Mordica Memorial Lecture will be delivered by Col. Allen B. Dove, Steel Company of Canada, Ltd.
Wire Association Annual Meeting of Members.
Stag Dinner and Smoker

There will be a registration fee of $5.00 for those attending the technical sessions and informal meetings.

Members should make reservations for rooms at the La Salle Hotel direct to the Secretary of the Wire Association. DO IT NOW, TODAY. We are expecting you!

This will be a meeting of top importance and a large attendance is expected. DON'T MISS IT!

THE WIRE ASSOCIATION

RICHARD E. BROWN, Executive Secretary

300 MAIN STREET STAMFORD, CONN.

PROGRAM

Annual Convention of The Wire Association

La Salle Hotel, Chicago, Ill., October 17-21, 1949

Wire Association Headquarters at The La Salle Hotel
Will be Open from Monday, October 17, Every Evening During the Convention
— Come and Get Acquainted!

THERE WILL BE A REGISTRATION FEE OF $5.00 FOR THOSE ATTENDING THESE TECHNICAL SESSIONS AND INFORMAL MEETINGS

ADMISSION WILL BE BY BADGE ONLY

Discussions Will Be Held on the Papers Presented and These Discussions Will Be Published in the January, 1950, Issue of Wire and Wire Products

WIRE ASSOCIATION PROGRAM COMMITTEE FOR 1949 CONVENTION

La Salle Hotel, Chicago, Ill., Oct. 17-21, 1949

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Fred M. Crapo, President
Indiana Steel & Wire Co., Muncie, Ind.
GENERAL CHAIRMAN

★ ★ ★

FERROUS DIVISION

A. E. Glen, Manager of Die Sales,
Carboloy Company, Inc.,
Detroit, Michigan, Chairman

MEMBERS

Wm. E. Hitchcock, Jr., Vice President
Atlantic Wire Company,
Branford, Conn.

James W. Galloway, Plant Engineer,
B. Greening Wire Co., Ltd.,
Hamilton, Ontario, Canada

Dartrey Lewis, Chief Engineer,
Development Engineering,
John A. Roebling's Sons Co.,
Trenton, N. J.

F. L. Hayden, Works Manager,
Steel Company of Canada, Ltd.,
334 Wellington St., No.,
Hamilton, Ontario, Canada

A. M. Reeder, Metallurgical Engineer,
Jones & Laughlin Steel Corp.,
Third & Ross Streets,
Pittsburgh, Penna.

H. B. Clark, General Manager
Vascoloy-Ramet Corp.,
800 Market Street,
Waukegan, Ill.

NON FERROUS DIVISION

L. C. Whitney, Chief Metallurgist,
Copperweld Steel Company,
Glassport, Pennsylvania, Chairman

MEMBERS

E. P. Hall, Metallurgist
Kennecott Wire and Cable Company,
Phillipsdale, Rhode Island

C. J. Beneke, Manager,
Reynolds Metals Company, No. 7,
2500 S. Third St.,
Louisville, Ky.

Matthew J. Donachie, Metallurgist,
The Beryllium Corporation,
Reading, Penna.

J. H. DeKlyn, Works Manager,
Fabricating Division,
Aluminum Company of America,
Massena, New York

C. H. Hannon, Metallurgist,
Pittsfield Works Laboratory,
General Electric Company,
Pittsfield, Mass.

Dr. F. R. Morral, Associate Professor,
Department of Materials Engineering,
Syracuse University
Syracuse, New York

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GENERAL ACTIVITIES

SMOKER-DINNER

Eber J. Hubbard, Jr., Vice President
Hubbard Spool Company
Chicago, Ill.

Richard E. Brown
Executive Secretary
THE WIRE ASSOCIATION
300 Main St., Stamford, Conn.

RESERVATIONS AND REGISTRATION

Mrs. Ruth S. Spengel, Secretary and Treasurer
WIRE AND WIRE PRODUCTS
300 Main St., Stamford, Conn.

All wire mill men and suppliers are invited to attend this meeting, see how the Association functions and participate in the activities.

Papers selected will be preprinted in Wire and Wire Products October 1949 issue in advance of the meeting. Title to papers accepted will be given the Wire Association and duly copyrighted at time of publication. All papers are eligible for consideration for the Annual Medal Award.

Hotel reservations should be made by members of the Wire Association direct to the Secretary.
MAKE YOUR PLANS NOW TO ATTEND AND SEND YOUR RESERVATION PROMPTLY

MONDAY, OCTOBER 17

9:00 A. M.
REGISTRATION

10:30 A. M.
DIRECTORS' MEETING

12:30 P. M.
PROGRAM COMMITTEE LUNCH

— The Technical Sessions —

La Salle Hotel, Chicago, Ill., October 17-21, 1949, Inclusive

MONDAY, OCTOBER 17
Morning Session—11 A. M.

A. F. Anjeskey
Sales Manager
Chairman of Meeting
Cleveland Tramrail Div.
Cleveland Crane & Eng. Co.
Wickliffe, O.

PAPER:
"Handling Wire & Wire Products in the Mill"

F. L. Hayden
Works Manager
Steel Company of Canada
Hamilton, Ont., Canada.

PAPER:
"Possibilities in Handling Wire & Wire Products"

J. W. Galloway
Chief Engineer
B. Greening Wire Co., Ltd.
Hamilton, Ont., Canada.

MONDAY, OCTOBER 17
Afternoon Session—2 P. M.

Curtis Voigtlander
Supt. Wire Mill
Chairman of Meeting
Union Wire Rope Corp.
Kansas City, Mo.

PAPER:
"Plastic Strain & Hysteresis in Drawn Steel Wire"

R. S. Brown
Chief Metallurgist
Rylands Brothers, Ltd.
Warrington, England.

PAPER:
"Back Pull Wire Drawing"

H. J. Godfrey
Development Engineer and
Dartrey Lewis
Chief Development Engineer
John A. Roebling's Sons Co.
Trenton, N. J.

TUESDAY, OCTOBER 18

THERE WILL BE A PLANT INSPECTION

TRIP TO

The Joliet Mills
American Steel & Wire Company

Luncheon will be served at the plant by courtesy of The American Steel & Wire Company

Busses leave La Salle Hotel 8:30 A. M.—No private cars allowed.

WEDNESDAY, OCTOBER 19
Morning Session—10:00 A. M.

E. J. Crum
General Foreman Wire Drawing
Chairman of Meeting
Bethlehem Steel Corp.
Sparrows Point, Md.

— SYMPOSIUM ON TUNGSTEN CARBIDE DIES —

Walter Schofield, Die Service Engineer
Carboloy Co.
Detroit, Mich.

E. A. Henry
Die Engineer
Vascoloy-Ramet Corp.
Chicago, Ill.

E. R. Duthaler
Jones & Laughlin Steel Corp.
Aliquippa, Pa.

E. T. Miller
Sales Eng. Dept.
Firth Sterling Steel & Carbide Corp.
McKeesport, Pa.

George Fecsen
Pittsburgh Steel Corp.
Pittsburgh, Pa.

Art Hedman
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp.
Buffalo, N. Y.

WEDNESDAY, OCTOBER 19
1:00 P. M.

WIRE ASSOCIATION LUNCHEON—
THE MORDICA MEMORIAL LECTURE

Col. Allan B. Dove,
Superintendent
Dominion Works
Steel Company of Canada, Ltd.
Lachine, Quebec, Canada

Title: "The Corrosion of Steel and Its Protective Metal Coatings"

— Presentation of the Wire Association Medal Award for 1948 —
To Reginald S. Brown, Rylands Brothers, Ltd., Warrington, England.
(Members are at liberty to bring guests. Ladies are welcome)

— The Technical Sessions —

La Salle Hotel, Chicago, Ill., October 17-21, 1949, Inclusive

WEDNESDAY, OCTOBER 19
4:00 P. M.

Annual Meeting of the Wire Association
L. D. Seymour, President
Chairman of Meeting

WEDNESDAY, OCTOBER 19
Evening Session—7:00 P. M.

ANNUAL DINNER - SMOKER — HOTEL LA SALLE
Eber Hubbard, Jr., Vice President
Hubbard Spool Company, Chicago, Ill.
Chairman of Committee

THURSDAY, OCTOBER 20
Morning Session—10:00 A. M.

	R. S. Simmons General Metallurgist Chairman of Meeting	Keystone Steel & Wire Co. Peoria, Ill.
PAPER: "Continuous Cleaning"	by D. L. Doty Supervisor—Inspection Div.	Jones & Laughlin Steel Corp. Aliquippa, Pa.
PAPER: "Processing of Stainless Steel Wire"	by S. P. Watkins Asst. to Gen. Mgr.	Armco Steel Corp. Baltimore, Md.
PAPER: "Welding in the Wire Industry	J. H. Corson Metallurgist	John A. Roebling's Sons Co. Trenton, N. J.

THURSDAY, OCTOBER 20
Afternoon Session—2:30 P. M.

SYMPOSIUM ON DIAMOND DIES

Athos D. Leveridge,
Executive Manager,
Chairman of Meeting

Industrial Diamond
Association of America, Inc.
New York, N. Y.

This session will consist of a paper open to discussion and this paper will be accompanied by slides and motion pictures. A panel of four diamond die men will then undertake the discussion and four representatives of mills will participate in the questions and answers. A further general discussion will then be open to all in the audience. There will be an exhibit of industrial diamonds and wire drawing dies and their application with attendants prepared to answer technical questions as they may arise in connection with the exhibit.

FRIDAY, OCTOBER 21
Morning Session—10:00 A. M.

	D. Boyd Metallurgist Chairman of Meeting	Wire & Cable Div. Northern Electric Co., Ltd. Montreal, P.Q., Canada.
PAPER: "Spools for Shipping Magnet Wire"	F. A. Rappelyea Chief Engineer	Hubbard Spool Company Chicago, Ill.
PAPER: "New General Electric Company Copper Mill"	F. A. Arnold Metallurgist	General Electric Company Fort Wayne, Ind.

FRIDAY, OCTOBER 21
Afternoon Session—2:00 P. M.

	Dr. Bruce W. Gonser Research Supervisor, Non-Ferrous Metallurgy Chairman of Meeting	Battelle Memorial Institute Columbus, Ohio.
PAPER: "Protective Atmospheres for Annealing Non-Ferrous Wires"	E. G. deCoriolis, Dir. of Research and Orville E. Cullen, Chf. Metallurgist	Surface Combustion Corporation Toledo, O.
PAPER: "New Development in the Tinning of Wire"	Herbert Hirschland Research Department	Metal & Thermit Corp. New York, N. Y.
PAPER: "Nylon Insulation"	C. A. Litzler Chief Engineer	Industrial Ovens, Inc. Cleveland, O.

RESEARCH PAPERS ARE PREPRINTED IN THE OCTOBER ISSUE OF WIRE AND WIRE PRODUCTS
The Discussions and the Mordica Memorial Lecture will be printed in the January, 1950, issue of Wire and Wire Products

Papers not received in time for preprinting will be published in the November and December issues of Wire and Wire Products

The San Francisco Cable Cars and Cables

By Tom Gore
San Francisco, Cal.

An article on the San Francisco Cable cars and the cables used for their operation.

THE method of using moving cables as motive power for street railways originated in San Francisco. **Andrew Smith Hallidie** had perfected a system of overhead tramways for carrying ore in the gold mining fields, and in 1873 he built the first San Francisco cable railroad. It ran on Clay Street from Kearny Street to Jones Street and back. The first car ran at 5 a.m. August 1st, 1873. His option on the franchise to operate would have expired at noon that day. Mr. Hallidie was gripman on the first run.

★ ★ ★

MR. HALLIDIE was born in London in 1836 and came to San Francisco in 1852. His father had obtained many patents on wire rope manufacturing between the years 1835 and 1849. In 1856 he began to manufacture wire rope at The California Wire and Rope Works located at North Beach.

★ ★ ★

IN 1878 the California Street line was first placed in operation. The Clay Street Hill Railroad was merged in 1887 with The Jackson-Powell Cable Railroad and obtained the franchise to operate along Sacramento, Clay, Washington, Jackson and Powell Streets and over Mason Street to North Beach.

★ ★ ★

AT the present time (1949) there are seven units of endless cable in use. Four for the California system consisting of; the California Street line—2 cables one 18,600 feet and the other 13,400 feet; and the Hyde, Jones and O'Farrell Streets line—2 cables one 12,500 feet and the other 14,500 feet. The Municipal system uses three cables; 1 for the Washington-Jackson square, 16,575 feet long; 1 for the Powell Street line, 9,050 feet; and 1 for the Mason-Taylor Streets line, 10,050 feet long.

★ ★ ★

ALL cables are 1¼" diameter, six strands, each strand consisting of 10 small wires which are covered by 9 large wires. The 19 wires of each strand are twisted to the right and the six strands also twisted to the right, over a hemp core. The tensile strength of the cable is about 113,000 pounds. The cable weighs 2½ pounds per foot and travels approximately 9½ miles per hour.

★ ★ ★

THE life of a cable (barring accidents) varies from 120 days to 490 days. The life expectancies of the different cables are; Hyde-Pine-Jones-O'Farrell cable 190 days; Hyde Street cable 230 days; the California-Market cable 325 days; the California-Presidio Avenue cable 490 days; the Washington-Jackson cable 290 days; the Powell-Market cable 120 days; and the Mason-Taylor cable 130 days.

★ ★ ★

THE cars of the California system are double-ended with a set of controls at each end. These cars are 30 ft. overall, seat 34 people and weigh about 6½ tons. The Municipal line cars are single-ended (Powell Street turn-table). They are 27 ft. overall, seat 29 and weigh about 6 tons. There are three short double-enders for the Jones-Market Shuttle which are 22 ft. overall, seat 22 and weigh about 5 tons.

★ ★ ★

THE gripman has the following controls; 1). the BELL!, 2). the EMERGENCY BRAKE LEVER

(*Please turn to page* 790)

AT RUSH HOUR PEAKS.

22 passenger Jones Street Shuttle has carried	67 !
29 passenger Powell Street car has carried	123 !
34 passenger California type has carried	135 !

STEEPNESS OF THE HILLS.

ON STREET	BETWEEN	% GRADIENT
California	Grant-Stockton	18.2
California	Stockton-Powell	16.2
California	Powell-Mason	11.4
California	Franklin-Gough	12.1
Hyde	Bay-Francisco	21.0
Hyde	Francisco-Chestnut	20.6
Hyde	Chestnut-Lombard	18.2
Jones	Sutter-Bush	12.7
Jones	Bush-Pine	14.9
Powell	Sutter-Bush	15.6
Powell	Bush-Pine	17.1
Powell	Pine-California	16.7
Washington	Mason-Taylor	17.0
Washington	Taylor-Jones	19.4
Jackson	Mason-Taylor	15.8
Jackson	Taylor-Jones	14.7

Keystone's New Rod Mill

NEW tonnage records are being set in the rod mill of the **Keystone Steel & Wire Company** at Peoria, Illinois, following the rebuilding and modernization of the plant last fall.

★ ★ ★

THE **Keystone** rod mill had been in almost continuous operation from its opening in 1917 until last September. In the meantime, demand for wire had brought improved drawing equipment to the wire mill, machines that consumed the rods faster than they were rolled. Steel production had also been speeded up by the use of oxygen in the open hearth furnaces. For some time, therefore, greater rod-rolling capacity had been needed to maintain balanced operations.

★ ★ ★

WILLIAM HERMAN, veteran rolling mill superintendent, conceived a plan for improving the mill's rod-rolling practice, speeding up not only rod, but billet output. Under the leadership of **A. H. Sommer,** general steel plant superintendent, Mr. Herman's ideas were further developed by chief engineer, **J. C. Newell.** Electrical engineer, **William H. Brown,** who revised the motor arrangements to meet the added power needs completed the electric work in astounding time, saving weeks of work by prefabricating the wiring installation. This group and their able assistants led the operating crews and construction men in round-the-clock labor, tearing out the old and putting in the new.

★ ★ ★

THE rod mill, operating today, reduces in 19 rolls a 2¼" square billet to a rod slightly below ¼" in diameter. At top speed, finished rods are being ejected at 4500 ft. per minute simultaneously on four reels. The old mill consisted of 18 stands which rolled a 1¾" square billet into a ¼" round at 3950 ft. per minute.

★ ★ ★

EQUIPMENT changes in this modernization included the addition of two large United Engineering roughing stands to handle larger size billets, the transfer of some intermediate stands to a higher speed position, thus increasing the delivery speed and tonnage from the finishing mill.

★ ★ ★

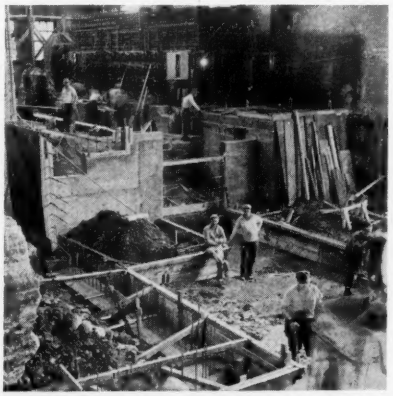
RELOCATION of the existing mill motors and the addition of a 1000 HP motor to drive the finishing mill through a cluster gear unit rather than a belt necessitated the enlargement and complete rebuilding of the motor room. The speed of the four new Morgan laying reels which were built to handle 500 lb. coils, is varied automatically through electronic controls as the speed of the finishing mill changes.

★ ★ ★

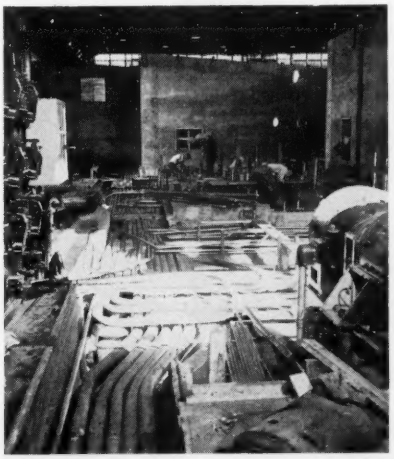
ORIGINALLY scheduled for four or five weeks, this shutdown was completed as quickly as possible by thorough, intelligent preparations. Sidewalls for the motor room, for instance, were poured while the mill was operating; all conduit was preformed, numbered, and keyed to blueprints for immediate installation; all foreseeable material needs were on hand.

★ ★ ★

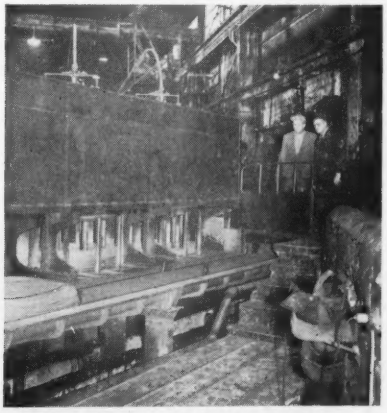
(*Please turn to page* 787)



Partial view of concrete base being poured for motors and new motor room (to the left foreground is the floor of the rod mill—in the background is the control section of the motor room). 575 cubic yards of concrete were poured during the rod mill rebuilding. * * *



View of the motor room prior to laying the floor; all this conduit was preformed prior to the plant shutdown. * * * *



Herb Mason, second shift foreman, and Wm. Herman, Rolling Mill's Superintendent, watching some of the first reels of rods rolled in the rebuilt mill. * * * *

Report on Wire Rope Standards for Export

THE National Bureau of Standards, U. S. Department of Commerce, Washington, D. C., has issued some new reports, among which is CS154E-49 entitled "WIRE ROPE (Export Classification)".

★ ★ ★

IT sets forth approved commercial standards, giving minimum requirements as to material, construction and test methods for wire rope manufactured in the United States. It contains 59 pages and costs 15 cents. It may be ordered from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

★ ★ ★

New Etching Process Developed by Ford

A REVOLUTIONARY new etching process to prepare metal surfaces for microscopic examination and photography has been developed by the **Ford Motor Company.**

★ ★ ★

THE unique metal-etching method—never before used in industry — utilizes ionized atoms. The process is known as cathodic vacuum etching. Cathodic vacuum etching has brought an important improvement. It enables the taking of an unusually clear photograph of flow lines—a curious strata-like pattern which indicates the direction the metal flowed when deformed under high pressure.

★ ★ ★

THE metal sample is placed in a partial vacuum with argon, a rare gas found in the air. Twelve thousand volts of electricity are charged into the vacuum, creating argon ions which bombard the metal surface and knock off minute particles.

★ ★ ★

UNDER this method the physical features of metal can be examined under a microscope and measured accurately as to their effect on strength and performance. Flow lines in steel samples previously undetected now have been revealed by cathodic bombardment.

★ ★ ★

COMPARISON of the structure pattern produced by the best chemical etching method revealed that the new cathodic treatment brings out the true microstructure of the metal with greater detail and clarity.

★ ★ ★

Technical Data on Soldering Fluxes Issued

THE American Chemical Paint Company, Ambler, Pa., issued in July a new Technical Service Data Sheet, No. 5-2, covering their "Flosol" Soldering Fluxes.

★ ★ ★

IT is made in three types, in liquid, cream or paste consistencies. The manner of use and the characteristics of each is described as a guide to users of fluxes.

★ ★ ★

COPIES may be obtained by writing to the Company.

★ ★ ★

MICROMETER PRECISION — MICRO-WELD — TRADE MARK REG. U. S. PAT. OFF.

MODELS J-3-C and J-4-C AUTOMATIC

These welders are used for welding COPPER, ALUMINUM, and other non-ferrous wire ranging in size from .031" to .128" diameter.

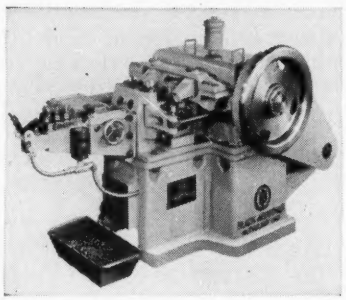
The welding cycle on these welders is automatically controlled and completed by a single downward stroke of the foot pedal, which include the clamping of the wire being welded, contacting the welding switch, and applying the upset pressure on the weld. All units are equipped with annealing dies, filing vise, light, extension cord, and mounted on a 4-wheel truck.

MICRO PRODUCTS COMPANY
20 NORTH WACKER DRIVE, CHICAGO 6, ILL.
Telephone, State 2-7468

Black Announces Improved Nail Machine

BLACK INDUSTRIES of Cleveland, Ohio, are now in production on a new model wire nail making machine. This is their Model "GB" which is primarily intended for making all the popular sizes of large head roofing nails, and further has the capacity to handle all other styles of nails up to a length of 3½".

★ ★ ★



Black's Improved Nail Machine * *

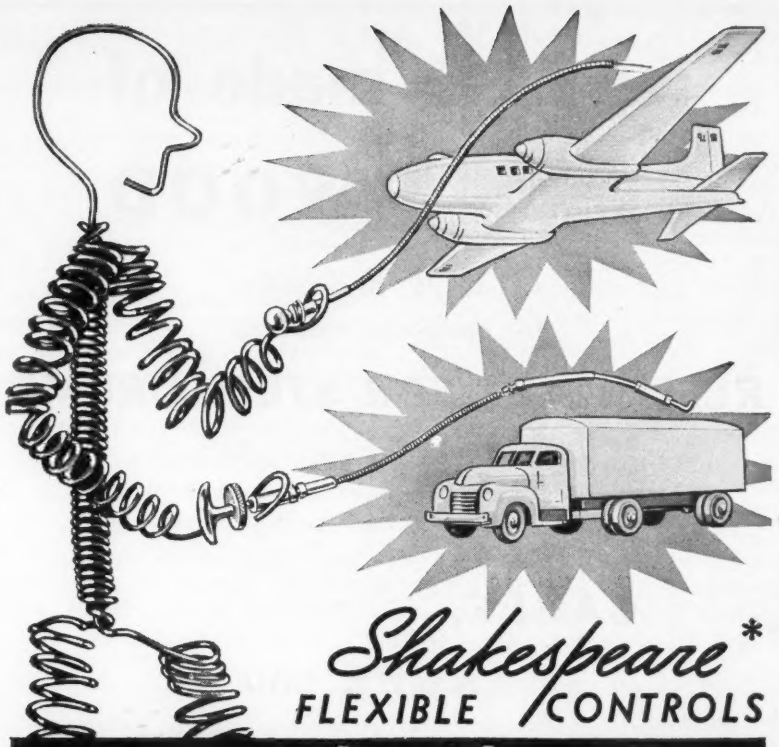
THIS new Model "GB" takes the place of their former Model "GA" and Model "EA" machines. Basically, it operates on the same principle as the "GA" model, but the design has been changed, the overall weight has been considerably reduced without sacrificing strength in the crankshaft, and a corresponding reduction in price has been made.

★ ★ ★

THIS new model has a number of improvements and new features which were found to be desirable from actual experience with the model "DA", commonly known as 8d machines, that have been in operation for some time in various nail mills throughout the country. The principle changes provide for an increase in the area that is pressure oil lubricated, and the placing of controls and adjustments for easy accessibility by the operator so that setup and maintenance are materially reduced.

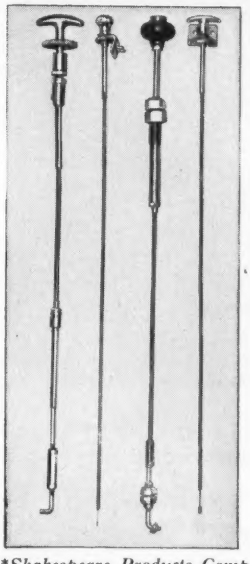
★ ★ ★

NEW specification list No. BI-235 and price list may be had by writing to the manufacturer, **Black Industries**, 1400 East 222nd Street, Cleveland 17, Ohio. A



Shakespeare* FLEXIBLE CONTROLS

made with KEYSTONE WIRE



Shakespeare flexible control cables for trucks and aircraft give sure dependability . . . sturdy efficiency through smooth, positive operation.

Because these control cables are "lifelines" between operator and motor, the types of wire used in their construction must meet rigid specification . . . conform to extremely close tolerances. Several types of Keystone wire are used . . . galvanized basic; drawn-after-galvanizing MB; brite MB and coppered MB. Each type of Keystone wire delivers in full the exact uniformity of strength, gauge and analysis required.

Regardless of the performance demanded in your wire products, consult Keystone for the materials to meet your most exacting specifications.

*Shakespeare Products Company
241 E. Kalamazoo Avenue
Kalamazoo 2, Michigan

KEYSTONE MUSIC SPRING WIRE

SPECIAL ANALYSIS WIRE for all industrial purposes

KEYSTONE STEEL & WIRE COMPANY
PEORIA 7, ILLINOIS

REELS made of

RETURNABLE AND NON-RETURNABLE **WOOD**

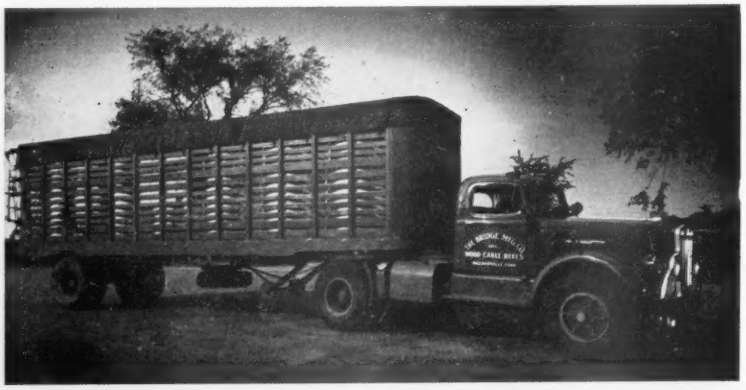
12" to 96" in diameter
for complete reels and

REEL HEADS FOR STEEL DRUMS

Bridge SHIPPING and SHOP REELS are furnished assembled or knocked down, made to your specifications. Built to withstand severest handling. Sturdy, strong, low in cost. Made for

CABLE,
ROPE and
WIRE

and delivered anywhere within a radius of 200 miles of Hazardville by means of Bridge trucks.



This service includes over-night delivery of reels, in case of urgent need, direct to your plant. You are invited to avail yourselves of this unique and convenient facility.

Send us your specifications and let us quote on costs.

BRIDGE MFG. CO., Inc.
HAZARDVILLE • CONNECTICUT

handy two-page nail specification chart, giving dimensions of all popular nail sizes used in this country, is also available upon request.

★ ★ ★

Standard Machinery Company Brings Out Line of Extruding Machinery

THE company, located at Mystic, Conn., has been building a complete line of thermo-plastic and rubber extruders, continuous vulcanizing units, take-up and other equipment for more than a year. They are said to embody advanced engineering ideas that will give the equipment the greatest versatility and adaptability.

★ ★ ★

STANDARD has been licensed by the Western Electric Company to make vulcanizing equipment for rubber covered wire and cable of designs controlled by them.

★ ★ ★

BESIDES this, they are engaged in the design engineering and manufacture of specialized insulating machinery of custom-built types.

★ ★ ★

BEN DAVIS, for many years well known to manufacturers of electric wire and cable, is in charge of this unit of the **Standard Machinery Company,** now in its second century of operation.

★ ★ ★

New Wire Plant in California

PRODUCTION is now underway in the new $1.5 million wire products plant of **L. A. Young Spring & Wire Corp.** at San Leandro, Calif. All equipment has been removed from previous facilities at Oakland.

★ ★ ★

SAID to be the world's largest manufacturer of diversified wire products, the company has its headquarters in Detroit, with branch plants at Los Angeles and San Leandro.

★ ★ ★

Outstanding Personalities of the Wire Industry

Harold Cope Made Gen. Superintendent of Donora Steel and Wire

HAROLD COPE has been appointed general superintendent of **Donora Steel and Wire Works** of American Steel and Wire Company. Mr. Cope replaces **L. J. Westhaver,** who has been made manager of operations for the company's Duluth, Minnesota District.

★ ★ ★

MR. Cope comes to the Donora plant from Cleveland where he has been general superintendent of the company's Central Furnaces and Coke Works. His first service with the company was at Donora in 1910 where he served in the engineering department. He then became a foreman doing special work at the Newburg Steel Works in Cleveland in 1924, and was made general foreman of the Donora blast furnace department.

★ ★ ★

MR. Westhaver, a native of Melrose, Mass., and a graduate of Dartmouth College, joined the Wire Company in 1928 as a tester at South Works in Worcester, Mass. After a few months he transferred to open hearth work and in 1930 was made a general foreman. Becoming assistant superintendent and then superintendent of the open hearth and rod mill, he was named superintendent of the Steel Works in 1939.

★ ★ ★

IN 1942 he left Worcester to become assistant general superintendent of the Donora Steel and Wire Works and in 1943 became general superintendent.

★ ★ ★

Universal-Cyclops Elections

W. J. LONG and W. G. Stewart have been elected vice presidents of **Universal-Cylops Steel Corp.,** Bridgeville, Pa. Mr. Long has been with the company for 20 years in various sales positions, serving as manager of tool steel sales since 1945. Mr. Stewart has been assistant secretary since 1942, and has been with the company 20 years in various sales and administrative capacities.

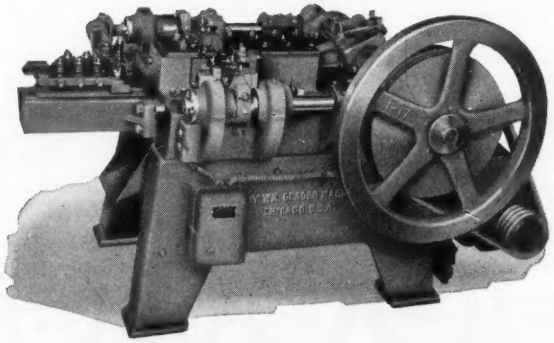
★ ★ ★

C F & I Appointments

HOWARD J. DAVIS, who joined **Colorado Fuel & Iron Corp.,** Denver, in 1940 to establish a Welded Wire Fabric Division centering at Pueblo, Colo., has been appointed assistant general manager, commercial steel sales, Western Division. **R. L. Hanes,** district sales manager at Fort Worth, Tex., has been appointed to succeed Mr. Davis as manager of sales, wire products, Western Division.

★ ★ ★

GLADER HIGH SPEED WIRE NAIL MACHINE



MACHINE ARRANGED FOR INDIVIDUAL MOTOR DRIVE

High tonnage output, and low maintenance costs, have resulted in Glader Machines being accepted as standard equipment in every large nail mill built in the United States in the past twenty years.

Glader Machines are operating in most of the wire producing mills throughout the world.

These machines are made in eleven different types and sizes. This enables us to cover the range of sizes of nails produced with the greatest efficiency.

For further information please address,

WM. GLADER MACHINE WORKS
210 No. Racine Ave.
Chicago 7, Illinois
Export Dept.: 122 E. 42nd Street, New York 17, N. Y.

F. P. Leahey, Executive Vice President of Nichols Wire & Aluminum

NICHOLAS Wire & Aluminum Company announces that **Frank P. Leahey's** position has been changed from that of vice president to executive vice president.

★ ★ ★

MR. Leahey has been with the Nicholas Wire & Aluminum Company since 1946, and managed their operations at Battle Creek, Mich. He was made vice president in October, 1947, after he came to the general offices at Davenport.

★ ★ ★

MR. Leahey's entire career has been in the wire industry. He worked in operations for the American Steel & Wire Company for many years, both in Worcester and in Cleveland; and also, during the war, was associated with the Spencer Wire Company in West Brookfield, Mass.

★ ★ ★

John Moritz, Jr., to Represent Standard Industrial Compounds

JOHN MORITZ, JR., has been appointed by **Standard Industrial Compounds Co.**, 4600 W. Ferdinand Street, Chicago, Ill., to handle sales and service in the Indiana and Southern Territories. The company manufactures wire drawing compounds. At the same time it was announced that **Leonard Gaiser** has been made production Manager.

★ ★ ★

MR. MORITZ is well and widely known in the wire industry and his friends will be glad to hear of his new connection and extend to him their well-wishes.

★ ★ ★

Wean Equipment Corporation Appoints

JOHN W. ROGERS has been appointed sales manager, **Wean Equipment Corp.**, Cleveland. Mr. Rogers joined Wean in 1934 and had formerly served as a sales engineer.

★ ★ ★

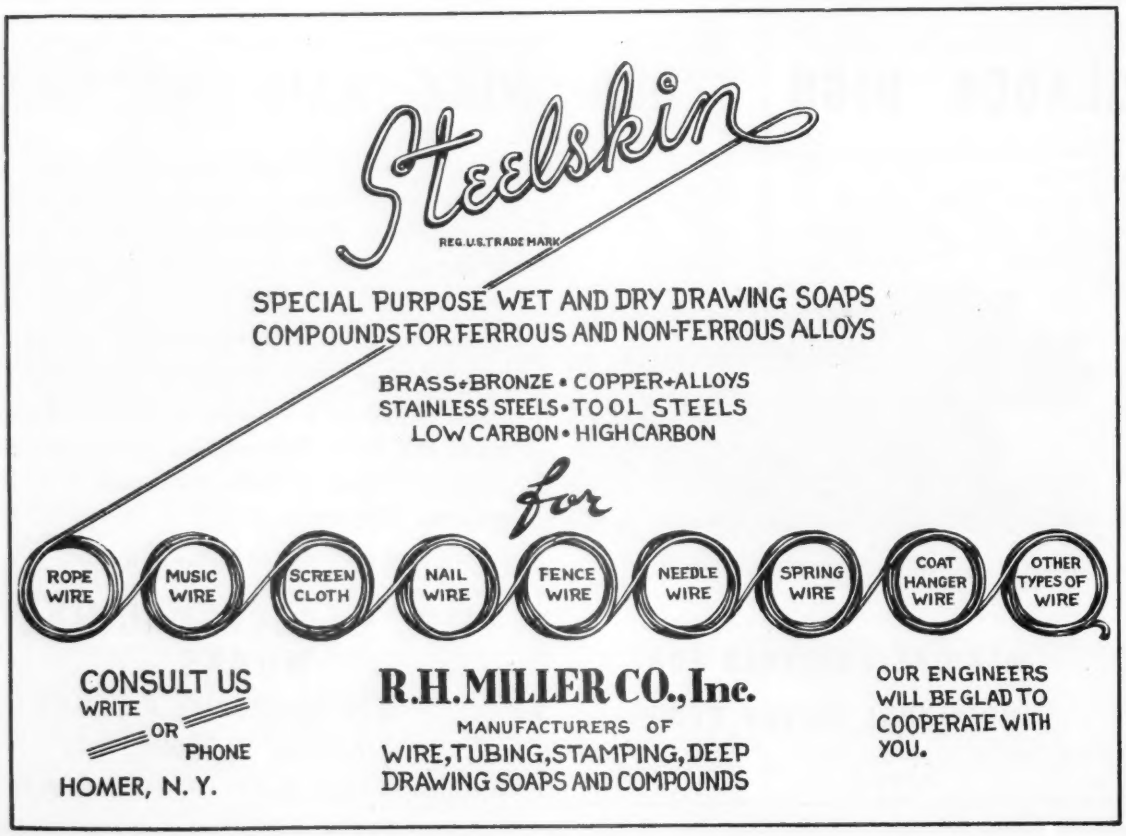
Mead W. Batchelor Promotion Announced

MEAD W. BATCHELOR has been promoted from vice president in charge of production to executive vice president, **Bridgeport Brass Co.**, Bridgeport, Conn. He has been with the company since 1933, when he came from Revere Copper & Brass Inc. to join the engineering staff. In 1945 he was made vice president of production, and a director. In 1946, when the company joined with Noranda Mines Ltd. of Canada in the formation of Noranda Copper & Brass Ltd. of Montreal, Mr. Batchelor became vice president of that company.

★ ★ ★

W. M. Moffatt Made Vice President of American Brass

PRESIDENT Arthur H. Quigley of the **American Brass Company** has announced the election of **William M. Moffatt** as vice president in charge of manufacturing.



Mr. Moffatt an employee of the company for 36 years and director of mill operations will succeed **Raymond E. Bassett,** whose retirement became effective July 1st. Mr. Bassett has been connected with the company for 48 years.

★ ★ ★

MR. Moffatt will direct production, engineering, technical and industrial relations in all ABC branches. In addition to the Waterbury divisions he will supervise branches in Ansonia, Torrington, Buffalo, N. Y., Detroit, Kenosha, Wis., and New Toronto, Ont. He joined the company in 1913 as clerk in the Ansonia branch. He served for two years in the Army Quartermaster Corps during World War I and returned to the Ansonia division where he was placed in charge of incentive operations.

★ ★ ★

Armco Steel Corp. Appointments

FRANK H. FANNING, connected with **Armco Steel Corp.,** Middletown, O., in varying duties since 1909, has been elected vice president of operations, succeeding the late **F. E. Vigor. William H. Mitchell,** president, Mitchell Steel Co., Cincinnati, has been elected a director of Armco.

★ ★ ★

C. J. Beneke Appointed Production Manager for Wire, Rod & Cable Div. of Reynolds Metals Company.

C. J. BENEKE has been appointed product manager for the Wire, Rod, Bar, Structurals & Cable Division of **Reynolds Metals Co.** in Louisville, Ky. He joined the company in 1940, and set up its plant 7 merchant mill including its practices and personnel for production of wire, rod and bar. He later set up the structural mill at Listerhill, Ala., for production of large rods and structural shapes and supervised the extrusion plant 8 in Louisville during the latter part of the war.

★ ★ ★

Copperweld Steel Company Appointments

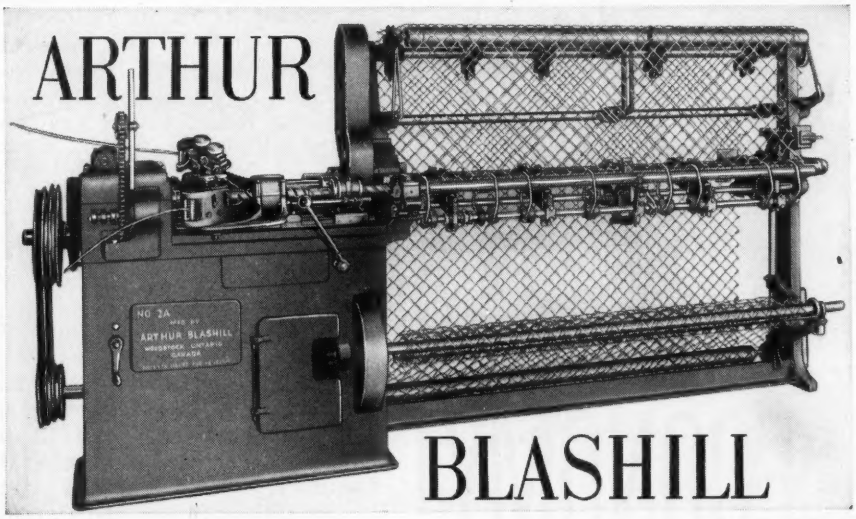
WILLIAM W. EGE has been promoted to the newly-created position of vice president, sales, wire and cable division, **Copperweld Steel Co.,** Glassport, Pa. He had formerly served as general manager of sales and prior to that had been in the company's Chicago office in charge of western district sales. **F. F. Leib** has been named assistant to vice president, sales, and **P. A. Terrell** has been appointed assistant vice president. Mr. Leib had formerly been assistant general manager of sales. Mr. Terrell had been assistant to the executive vice president.

★ ★ ★

Columbia Steel Co. Appointment

JAMES B. DU PRAU has been elected to fill the newly created position of vice president-administration of **Columbia Steel Co.,** San Francisco, subsidiary of United States Steel Corp. He has been serving as assistant to the president since 1943.

★ ★ ★



CUT
LABOUR and OVERHEAD
in Manufacturing
CHAIN-LINK FENCE
No. 2 A Machine marks a New Period in its production
CUTS LABOUR —
CUTS FLOOR SPACE —
CUTS POWER —
CUTS MAINTENANCE —
CUTS NOISE

Widest range of Gauges, Meshes and Heights By FAR the HIGHEST OUTPUT
(See previous ads. for details)

WOODSTOCK, ONTARIO, CANADA (formerly at Birmingham, England)

Harry Swanson Becomes President of Falls Spring & Wire Co.

DIRECTORS of the **Falls Spring & Wire Company** here, and of the **Great Lakes Spring Corporation** of Chicago, have filled the vacancies in their executive personnel caused by the recent death of William A. Falls, Detroit, president of both corporations.

★ ★ ★

HARRY SWANSON, a veteran of 30 years in automobile spring manufacturing, and secretary-treasurer of the Falls company since its inception, has been elected president of the company. He also continues as its treasurer.

★ ★ ★

HARRY FANTE, vice president of Great Lakes Spring since its founding, another spring manufacturer of 30 years experience, has been named as president and treasurer of the Chicago concern.

★ ★ ★

THE two organizations with their wholly-owned subsidiaries — Chelsea Spring Company of Chelsea, Mich., and Falls Spring Company of Kansas City, Mo., will continue to operate with the identical personnel which functioned under the late Mr. Falls.

★ ★ ★

THESE companies specialize in the manufacture of cushion springs and tubular seat frames for the automobile trade as well as in mechanical springs and other items for motor cars.

★ ★ ★

MR. FALLS had been in the spring business for 40 years up to the time of his death last month. Prior to 1935, he had been an executive and general manager of the L. A. Young Spring & Wire Corporation. Since 1935 he was associated with the above named concerns.

★ ★ ★

Standard Steel Spring Co. Appointments

EDWARD L. SEVERING has been elected assistant to the president, **Standard Steel Spring Co.**, Coraopolis, Pa. He has been assistant secretary and assistant treasurer. **Louis P. Monk,** vice president, and general manager of the Gary, Ind., Division, has been elected a director.

★ ★ ★

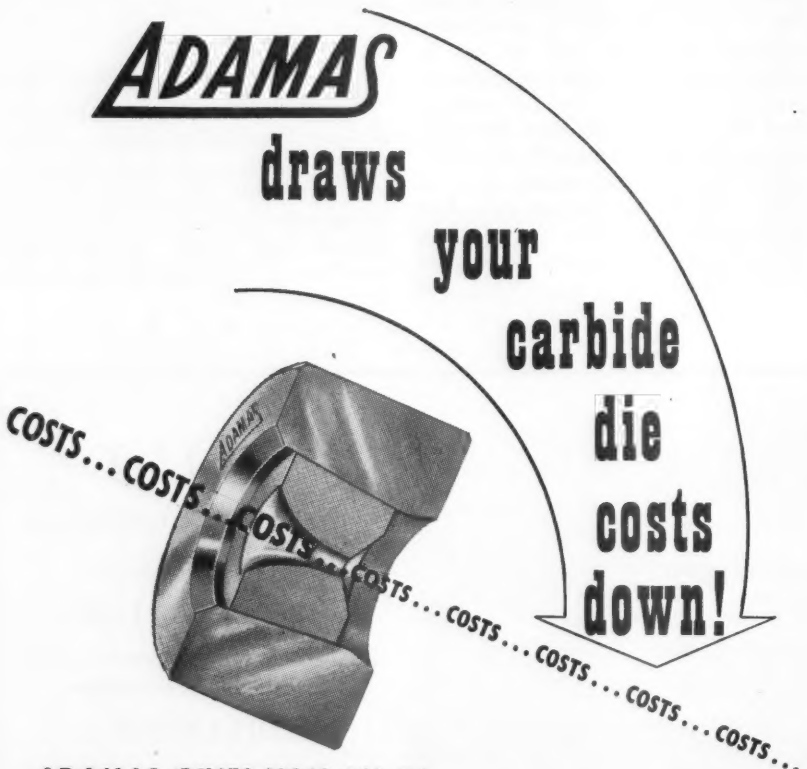
Lyman A. Wine Gets Auto-Lite Post

APPOINTMENT of **Lyman A. Wine** to the executive post of Assistant to the President has been announced by Royce G. Martin, President and Board Chairman of **The Electric Auto-Lite Company,** which operates 26 plants in the United States and Canada.

★ ★ ★

THIS is a newly created responsibility in the company and will concern both organization and customer contact duties. Mr. Wine will maintain offices in Detroit, Toledo and Cincinnati.

★ ★ ★



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1. Increased output means
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ECONOMY!

ADAMAS
CARBIDE CORPORATION
1000 South 4th Street • Harrison, New Jersey
Producers of top quality carbide for cutting tools, dies and wear resistance

Get ADAMAS DIE BULLETIN D-749 for full information on ADAMAS wire drawing dies, die nibs and wear parts for the wire industry.

A Review of Recent Wire Patents

NO. 2,474,904, DOUBLE STRANDED BLASTING MAT, patented July 5, 1949 by Joseph S. Mazzella, New York, N. Y.

The inventor provides a mat of a single length of flexible wire having two-stranded woofs.

★ ★ ★

NO. 2,475,056, WIRE STRIPPING MACHINE, patented July 5, 1949 by Nathan Rodney Schwartz, New York, N. Y., assignor to Saran Research Corporation.

Blades are provided mounted upon movable plates in such a way that the former may be readily replaced, and the relative position of the plates may be adjusted as required.

★ ★ ★

NO. 2,475,186, METHOD OF PROTECTING METALLIC SURFACES AGAINST TARNISHING AND CORROSION, patented July 5, 1949 by Jonas Kamlet, New York, N. Y., assignor to Boyle-Midway, Inc., New York, N. Y., a corporation of Delaware.

After enclosing the metal and surrounding air, in a confined space, the metal is treated with a sublimable corrosion inhibitor consisting essentially of a minor amount of an organic amine having a vapor pressure between about 7.5 and about 60 millimeters of mercury at 20°C. homogeneously distributed throughout the mass of a major amount of a non-corroding, solid, sublimable organic material having a melting point of at least 50°C. and a vapor pressure of at least 0.15 millimeter of mercury at 35°C., whereby the vapors from the corrosion inhibitor diffuse through the enclosed air and contact the metallic surfaces to be protected.

★ ★ ★

NO. 2,475,427, TWISTING MACHINE, patented July 5, 1949 by George E. Henning, Baltimore, Md., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

This machine is adapted to twist together resilient wire conductors.

★ ★ ★

NO. 2,475,944, PROCESS FOR PROTECTING FERROUS METAL SURFACES BY COATING AND DIPPING SOLUTION FOR USE THEREIN, patented July 12, 1949 by Charles W. Clark, Westmount, Quebec, and John H. Schloen, Montreal, Quebec, Canada, assignors to Canadian Copper Refiners Limited, Montreal East, Quebec, Canada, a corporation of Canada.

There are fifteen claims. The inventors employ one or more zinc compounds, a selenium compound and phosphoric acid.

★ ★ ★

NO. 2,476,180, APPARATUS FOR MAKING WIRE ROPE OF PREFORMED FLATTENED STRANDS, patented July 12, 1949 by John O. Charles, New Haven, Conn., assignor to The American Steel and Wire Company of New Jersey, a corporation of New Jersey.

More specifically, this patent relates to a rotary preforming head for the mast of a strand-laying machine.

★ ★ ★

NO. 2,476,278, APPARATUS FOR TESTING CONDUCTORS, patented July 19, 1949 by Wentworth D. Boynton, Woodbrook, Md., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

Complete Description and Drawings of Patents May Be Had for 50 cents, outside the United States and Canada $1.00. Address, Wire & Wire Products, 300 Main St., Stamford, Conn.

Controlled

OPERATING TEMPERATURES TO 650° F

The Royle Temperature Control Unit is designed to eliminate uncertainty in extrusion and other industrial processes which require accurate and constantly maintained operating temperatures of extended periods of time. This compact and simply operated unit will supply—or drain—heat in accordance with process specifications as established by laboratory experiments. Features are built into the self-contained Royle Temperature Control Unit to assure maximum results with a minimum of maintenance.

WRITE FOR COMPLETE DETAILS

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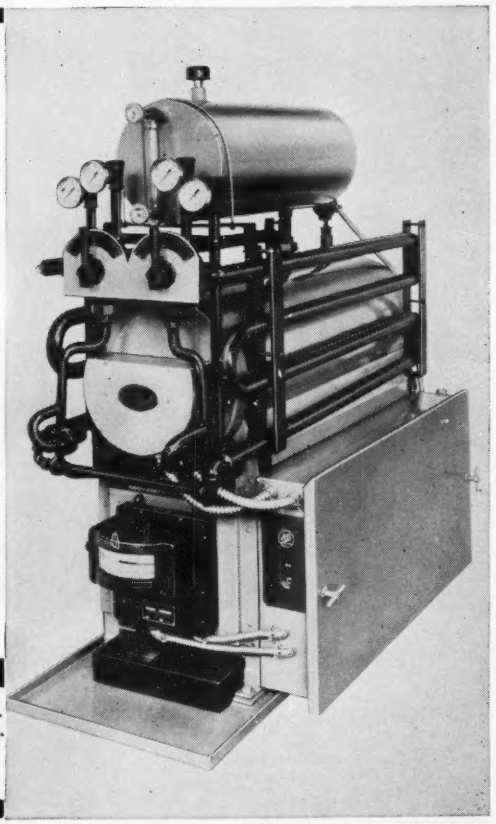
PIONEERED THE CONTINUOUS EXTRUSION PROCESS IN 1880

London, England	Home Office	Akron, Ohio	Los Angeles, Cal.
James Day (Machinery) Ltd.	E. B. Trout J. W. VanRiper	J. C. Clinefelter	H. M. Royal, Inc.
REgent 2430	SHerwood 2-8262	JEfferson 3264	LOgan 3261



The SPECIALISTS in Wire-Straightening and Wire-Cutting!

Diameter Range — 1/16" to .005"

PRECISION - Our Motto

DON'T hesitate to call on us when you are confronted with wire-straightening problems involving close tolerances and absolute accuracy. For seventeen years we have specialized in straightening and cutting all gauges of fine wire, hard or soft, ranging in diameter from one-sixteenth of an inch down to five-thousandths of an inch. We employ gun-barrel accuracy in straightening lengths from one inch to ten feet or any fractional part thereof. Ends cut absolutely clean without burrs.

●

ASK ABOUT OUR UNEXCELLED FACILITIES FOR CLEANING AND POINTING WIRE ALREADY STRAIGHTENED AND CUT.

ALL TYPES OF WIRE...

- Nickel
- Stainless Steel
- Bronze
- Brass
- Copper
- Alloy Wire
- Music Wire
- Tag Wire
- Florist Wire

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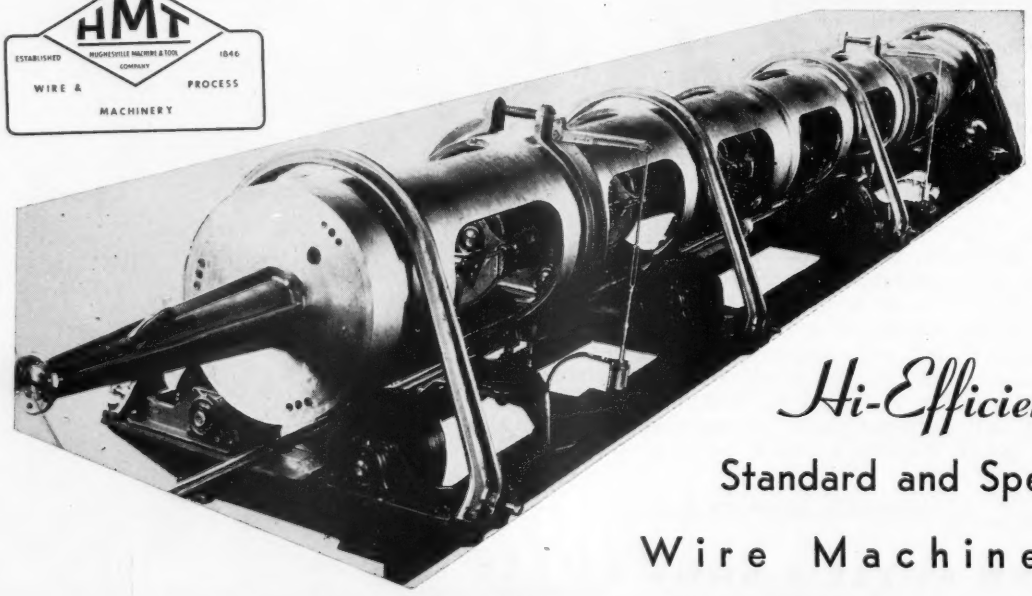
TELEPHONE: CEdar 4702

HMT — ESTABLISHED 1846 — HUGHESVILLE MACHINE & TOOL COMPANY — WIRE & PROCESS MACHINERY



Hi-Efficiency

Standard and Special

Wire Machinery

HUGHESVILLE MACHINE & TOOL COMPANY

HUGHESVILLE MACHINE & TOOL CO.
54 ACADEMY STREET
HUGHESVILLE, PA.
'Phone: 129-A

THE LARSON COMPANY
98 WELLINGTON STREET WEST
TORONTO, ONTARIO, CANADA
'Phone: Waverley 9867

In this apparatus there is a supply drum for holding a supply of an insulated conductor and a take-up drum for advancing the conductor from the supply drum, a number of staggered sheaves between the supply drum and the take-up drum to form a tortuous path along which the conductor is advanced, whereby the conductor is flexed and tensioned. Associated therewith is a test instrument.

★ ★ ★

NO. 2,476,279, APPARATUS FOR TESTING ELECTRICAL CONTINUITY, patented July 19, 1949 by Wentworth D. Boynton, Woodbrook, Md., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

★ ★ ★

This apparatus includes a device for placing under tension a suspended insulated conductor, staggered conductor-guiding means movable along the conductor for flexing the conductor, and a testing device connectable to the conductor for testing an electrical characteristic of the conductor while it is flexed and tensioned.

★ ★ ★

NO. 2,476,700, AQUEOUS BATH FOR COLORING STAINLESS STEEL, patented July 19, 1949 by Daniel J. Clini, Springfield, Mass., assignor to Heatbath Corporation, Indian Orchard, Mass., a corporation of Massachusetts.

The bath imparts a black coating to the steel and comprises a hydroxide 80 parts, a permanganate 2 parts, a sulphide 3 parts, a sulphate 1 part and sufficient water to give the bath a boiling point of about 250° F.

★ ★ ★

NO. 2,476,743, COIL SHAPING MACHINE, patented July 19, 1949 by John B. Leece, University Heights, Ohio, assignor to The Leece-Neville Company, Cleveland, Ohio, a corporation of Ohio.

Electrical coils of the hairpin type are shaped by this machine. There are 10 claims.

★ ★ ★

NO. 2,476,745, DEVICE FOR GRIPPING, LIFTING, AND HANDLING AN ANNULAR GROUP OF ARTICLES SUCH AS ELECTRICAL COILS, patented July 19, 1949 by John B. Leece, University Heights, Ohio, assignor to The Leece-Neville Company, Cleveland, Ohio, a corporation of Ohio.

There are 19 claims to this pick-up device, including an annular series of blades for clamping or releasing the coils, etc.

★ ★ ★

NO. 2,477,023, APPARATUS FOR TESTING CABLES, patented July 26, 1949 by Leslie Ernest Weaver, London, England, assignor, by mesne assignments, to International Standard Electric Corporation, New York, N. Y., a corporation of Delaware.

This apparatus is employed with an electrical transmission line for testing impedance irregularities in cables.

★ ★ ★

New Wire Mill for Italy

IN connection with the projects to modernize the Italian iron and steel industry as part of the country's four-year program which have been approved by the Economic Cooperation Administration, a project was approved for a continuous wire rod mill and bolt and nut equipment for SISMA at Villadessol—$2,450,000 in ECA funds and 1.6 billion lire. Equipment required includes rolling mill unit for billets complete with accessories, bolt maker for nuts and bolts. SISMA is a subsidiary of the Edison Company, producing merchant steel.

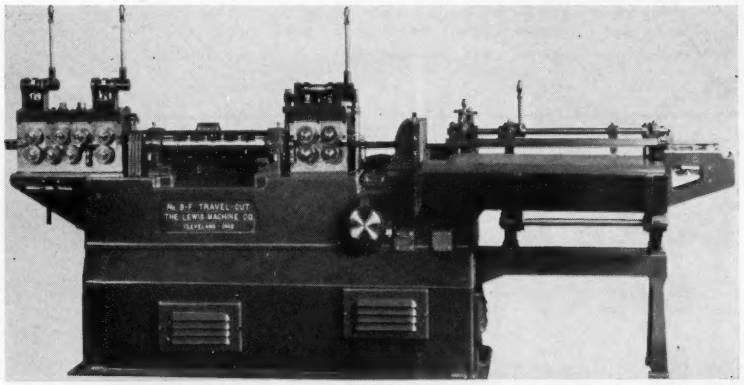
★ ★ ★

Plume & Atwood Mfg. Co. Appointments

ERNEST C. BRITTON, **James F. Curtiss, Michael C. Dolak, Harry MacCullum, Jr.** and **Henry L. Shepard** have been elected directors of **Plume & Atwood Mfg. Co.**, Waterbury, Conn. **Henry A. Delvy**, who served as controller for many years, has been elected treasurer.

CUT YOUR CUTTING COST WITH

LEWIS TRAVEL-CUT



Wire Straightening & Cutting Machines

The simplicity of design and rigid construction of the Lewis Travel-Cut makes it well suited for the most severe high-production requirements. This machine feeds the wire from the coil, straightens, gauges to accurate length, and cuts while in motion thus producing uniform diameter rod free of arbor swell and feed roll marks. It is particularly adapted to precision work on bright finished steel, brass, aluminum, stainless, and alloy wire. This method of cutting is also very efficient for short lengths such as welding rod, special bolts, etc., and increases the over-all efficiency approximately 20% over the conventional type of cut-off.

Machines built in various sizes to handle from 1/16" up to 3/4" diameter, and 1/16" to 5/8" square or equivalent area in hexagon and flat.

Exclusive Representatives

EAST: Penn Machinery Company, 117 North Third Street, Philadelphia 6, Pennsylvania.

MIDDLE WEST: Steel & Wire Machinery Company, 1017 Helmsdale Road, Cleveland 12, Ohio.

CENTRAL: Moslo Machinery Company, 2443 Prospect Avenue, Cleveland 15, Ohio.

CANADIAN: Empire Engineering Company, 11 Wellington Street East, Toronto 1, Ontario.

CONTINENTAL EUROPE: Gaston E. Marbaix, Ltd., Devonshire House, Vicarage Crescent, London S.W. 11, England.

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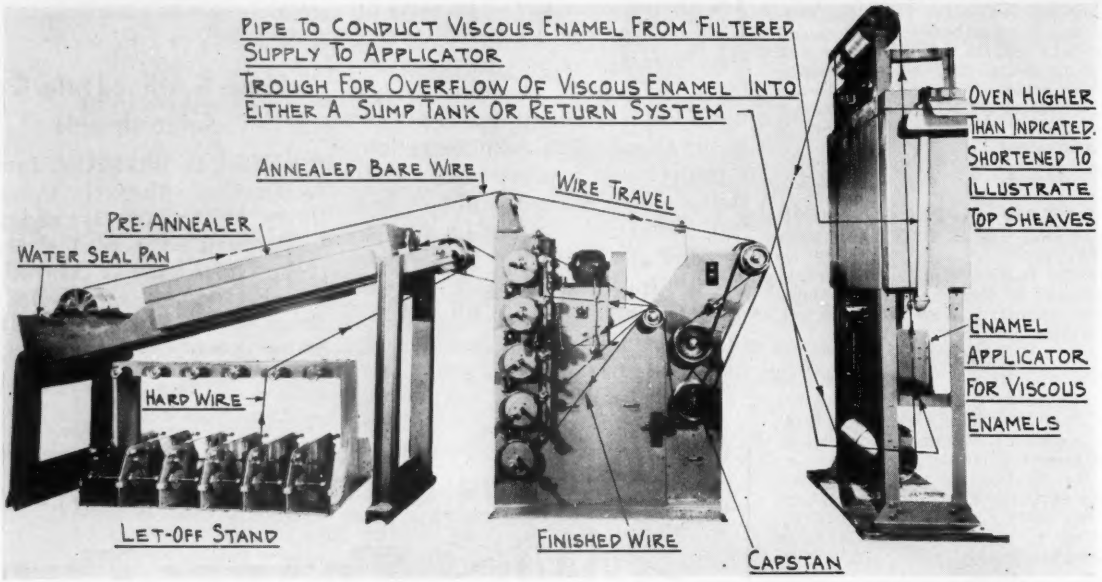
The LEWIS MACHINE Co.
3441 E. 76th STREET
CLEVELAND, OHIO

ENAMELING MACHINE ARRANGED FOR THE APPLICATION OF VISCOUS ENAMELS BY MEANS OF DIES


PIPE TO CONDUCT VISCOUS ENAMEL FROM FILTERED SUPPLY TO APPLICATOR
TROUGH FOR OVERFLOW OF VISCOUS ENAMEL INTO EITHER A SUMP TANK OR RETURN SYSTEM
ANNEALED BARE WIRE
WIRE TRAVEL
PRE-ANNEALER
WATER SEAL PAN
HARD WIRE
OVEN HIGHER THAN INDICATED. SHORTENED TO ILLUSTRATE TOP SHEAVES
ENAMEL APPLICATOR FOR VISCOUS ENAMELS
LET-OFF STAND
FINISHED WIRE
CAPSTAN

Take-up supplied with slip friction drive to the reel spindles, as shown, or by means of Torque Motors.

Filtering and circulation systems furnished for either single or battery operations. Metering dies large or small size available. *Write for details.*

EST. 1885 AIMco INC. 1918
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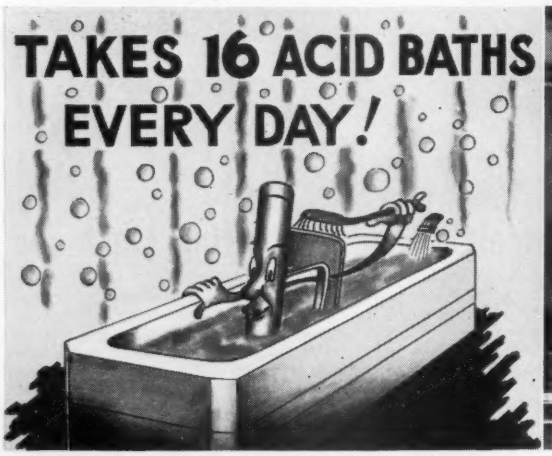
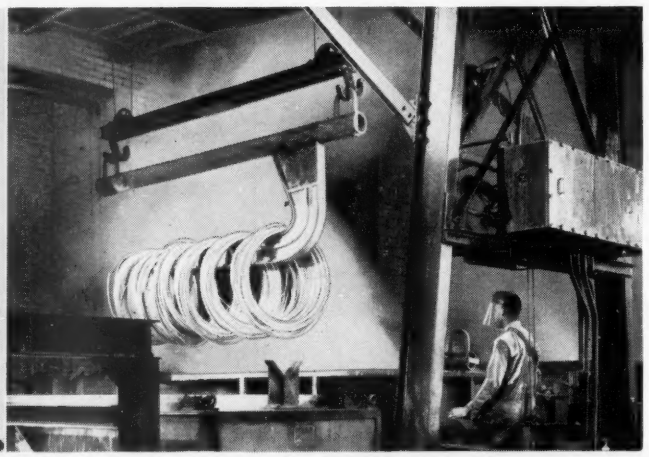




Yet this Weldco Pickling Hook Is Still On the Job After 3 Years' Service!

Installed in the Lamson & Sessions rod and wire mill in November, 1946, this lightweight hairpin hook is still going strong—in spite of continuous loading, pickling, liming and washing operations. This rigorous work goes on day after day, yet the Weldco hook stays right on the job . . . shows very little corrosion from the daily baths of hot 5% sulphuric acid solution. And thanks to its high strength, the hook carries payloads of 3000 pounds!

Weldco lightweight hairpin hooks will show an excellent service record in your plant, too. Why not find out today how they can improve your pickling operations and cut costs?

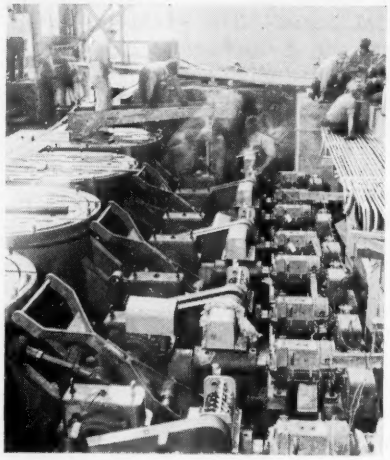
THE YOUNGSTOWN WELDING & ENGINEERING COMPANY

3735 OAKWOOD AVENUE . . . YOUNGSTOWN 9, OHIO

Keystone's New Rod Mill

(*Continued from page 775*)

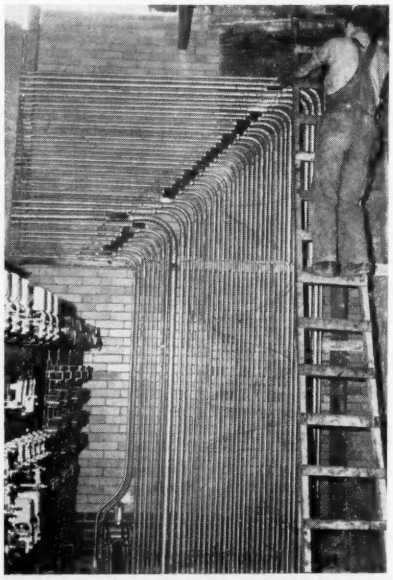
"THE delay saved by prefabricating this installation even before the rod mill shut down, has saved our members weeks of lost time," Bruce Hogue Vice President of the Independent Steel Workers Alliance, certified bargaining agent for Keystone em-



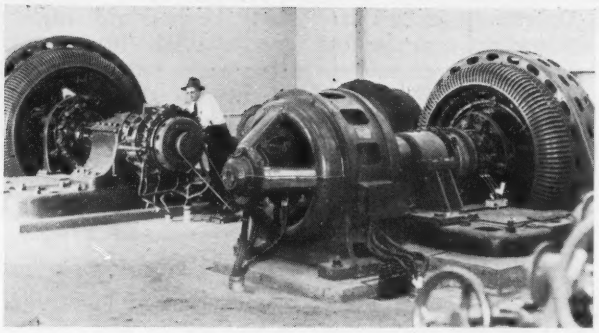
D—View of activities during installation of the new laying reels. * * * * *

ployees, wrote the Keystone management. ★ ★ ★

A large inventory of rods was built up during the summer vacation to insure wire drawing and product manufacture during the shutdown. Customers' tonnage allocations were pro rated, taking it into consideration.



E—Installation of conduit connecting control tower and motor room. The numbers used to identify each piece of pre-formed conduit can be seen at the bottom. * * * * *



F—In the rod mill new motor room Electrical Engineer Wm. H. Brown checks bearing temperature on 2500 HP roughing stands motor. * *

COMPLETION of the rod mill rebuilding was delayed three weeks due to complications in the gear cases. This necessitated reboring and realignment. In the meantime the supply of rods was

CHEMICALS ACP PROCESSES

IMPROVE PICKLING

MINIMIZE EMBRITTLEMENT

with

TRADE MARK

RODINE

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CHEMICALS ACP PROCESSES

RUST PROOFING AND PAINT BONDING
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Lithoform *
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RUST REMOVING AND PREVENTING
Deoxidine *
Peroline *

PICKLING ACID INHIBITORS
Rodine *®

A grade of "Rodine" is available to more completely prevent embrittling wire and other products in pickling. It does the same thorough inhibiting job so long and so generally associated with "Rodine" and efficient pickling.

Now, more than ever, it is cheaper to pickle with than without "Rodine".

For further details, write us at Ambler, or talk with the "Rodine" consultant who calls upon you.

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exhausted. Operations in the wire mill and fabricating departments just about ceased. Arrangements hastily made with other manufacturers to roll Keystone billets were inadequate to maintain any but skeleton operations in the wire mill.

★ ★ ★

WITH the rod mill returned to operation, rods are being rolled faster than ever before at Keystone. There is a large backlog of billets to be rolled, and new production records are anticipated in the rod mill. By the end of Keystone's fiscal year, June 30, 1949, hopes are high that the year's total output will do more than make up for this eight weeks' shutdown—that it will exceed last year's total production.

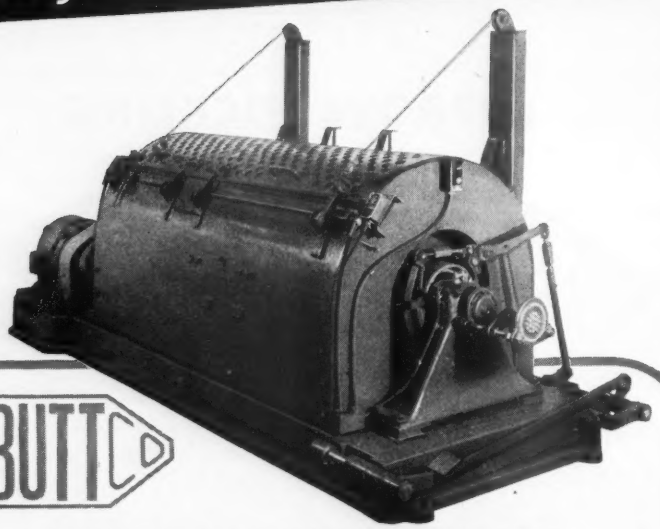
★ ★ ★

Packaging Coiled Strip and Wire

(*Continued from page 769*)

ALL coils of an inside diameter of 16" or more are shipped individually, without further protection unless special finish requires a single or double wrapping with any one of the wrapping materials available.

Give your Production a New Twist!



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HERE'S THE HIGH SPEED BUNCHER FOR FAST, ECONOMICAL TWISTING OF SMALL WIRES

Check these big features:

- ☐ Two twists produced at each revolution
- ☐ Accommodates standard shop reels up to 24" dia. x 12¼" O.A. width
- ☐ Double drum grooved capstans
- ☐ Quick acting electrically operated brakes
- ☐ Push button control station
- ☐ Substantial guards and safety features
- ☐ Anti-friction bearings
- ☐ Rugged construction with low center of gravity

Butt High Speed Bunchers are made in two sizes: S-31 for strands up to No. 14; S-35 for strands up to No. 8. *For further details write for Circular No. 63.*

NEW ENGLAND BUTT COMPANY
Established 1842
304 PEARL STREET • PROVIDENCE 7, R. I., U. S. A.
JAMES DAY (MACHINERY) LTD., 80 REGENT ST., LONDON, W. 1, ENGLAND

SPECIAL commodities, such as valve spring wire, naturally are handled with extreme care and are usually protected with a tough burlap combination paper.

★ ★ ★

COILS smaller than 16" inside diameter, which include the 8" and 12" coils, are usually all shipped in containers; i.e., barrels, drums and boxes. The container is paper lined and coils are packed without individual wrapping, unless special finish requires additional protection.

★ ★ ★

GLASS netting wire, used to reinforce glass panels, must be handled by the operator with buckskin gloves as the slightest touch by human hands might cause corrosion of the wire and the consequent formation of air bubbles when the netting is placed into the molten glass. Coils are double wrapped, packed in lined barrels or drums. In many cases, a dehydrant like silica-gel is placed inside the container to exclude any possibility of condensation through high humidity. Needle wire is usually well oiled before wrapping and then placed into the containers.

★ ★ ★

MUSIC, piano and mandolin wire is furnished in coils ranging in weight from ¼ lb. and up. Each small coil is double wrapped in waxed paper then placed in a sealed envelope or fancy box before packaging in the shipping containers.

★ ★ ★

BOOKBINDER and stitching wire is packed on paper cores or wound on spools of 5 or 10 lbs. each, and packed in fibre shipping containers with separators between each coil.

★ ★ ★

I WOULD like to mention briefly the packaging of cut length material. Fine sizes and short lengths are usually put up in hand bundles up to about 150 lbs. in weight. Florist wire which may be furnished plain or painted green, is packed 12 lbs. to a fibre box. Welding wire generally is shipped in 50 lb. bundles. However it also

may be packed in metal containers in weights of about 2000 lbs. and shipped direct to the electrode manufacturer for further processing. Heavier rounds over 5/16" diameter are handled similar to cold finished bars in lifts of 3 tons, loaded wrapped or shrouded in open top equipment. This is in contrast to other wire products, which are shipped almost exclusively in closed cars.

★ ★ ★

BEFORE discussing unit handling of wire products I would like to say a few words about protective coatings or rust inhibitors, simply called "Oiling." Bright drawn wire, strip steel or other specialties must be protected adequately against rust and corrosion which may occur as a result of free moisture in the air or condensation during transit or storage at the warehouse. In determining the type (and) (or) consistency of the rust preventive best suited to a particular grade of steel, a simple but complete analysis should be made of the situation. Recently, rust inhibitors have been developed which are far superior to straight petroleum oils, which do not wet the steel surface sufficiently. Rust inhibitive compounds have a lower surface tension than water and therefore are not displaced by moisture which is either shed or emulsifies. Corrosive fumes are also neutralized in the inhibiting film. This protection is provided until the film is destroyed. A light coating of inhibitor properly applied, therefore, will provide many times the protection afforded by a light coat of oil. The use of heavy inhibitors is only warranted with increased severity of condition. The lightest grade which can safely be used is recommended in order to provide the greatest coverage per gallon of rust preventive. It is not the cost per gallon of oil which controls cost of application, but the coverage in square feet per gallon obtained from a certain rust inhibitor.

★ ★ ★

WHILE some wire products like spools, boxed material, nails, barbed wire, yes, even fence, lend themselves well to platform or pallet handling, very little actual shipping is being done in that manner. Coiled wire for inter-mill handling is placed on racks, but is usually unloaded at the loading dock by hand and shipped nested. Heavy coils weighing over 400 lbs. are handled by ram tractor and loaded in an upright position.

★ ★ ★

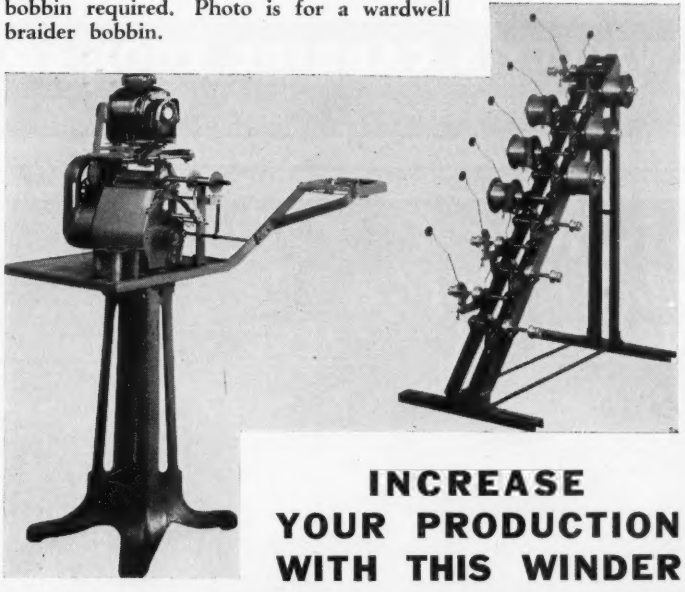
UNDOUBTEDLY considerable progress has been made in unit handling of the finished wire product, but much remains to be done. Manual labor of handling coiled wire and packaged material should be entirely eliminated.

★ ★ ★

RECENTLY, there has been developed a mechanical bundling bench which eliminates the strenuous labor of hand bundling. Similarly, there will be found in the future, a way to handle coiled wire in units from bundling and inspection through warehousing and shipping to customers' plants. This, of course, demands cooperation of all, including the common carriers. To reduce unloading and ware-

STANDARD UNI-DRIVE WIRE WINDER

Spindle can be made to fit any spool or bobbin required. Photo is for a wardwell braider bobbin.



INCREASE YOUR PRODUCTION WITH THIS WINDER

Main drive belts done away with. Traverse variation from ½" to 6" between heads without changing cam. Equipped with ¼" H. P. A. C. motor for 110 volts, 60 cycle current, single phase. Incorporates many valuable new features. Winds up to 10 ends on each spool. New micrometer variable traverse motion winds evenly between heads. Geared wind produces straight parallel wind which eliminates jumping of guide on braider latch. Starts slow. Makes possible greatly increased production.

Over 1000 of these winders in successful operation. You should have full information on this winder in your files. Please write to nearest office for particulars.

STANDARD MILL SUPPLY

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by **WILLEY'S**

One of the complicated extrusion dies with tungsten carbide insert, made by Willey's using the new, inverted casing method, which insures permanent mounting, rigidity and long life. Ideal for cold heading applications. For full information regarding this new type casing, submit your die problems to Willey's engineers.

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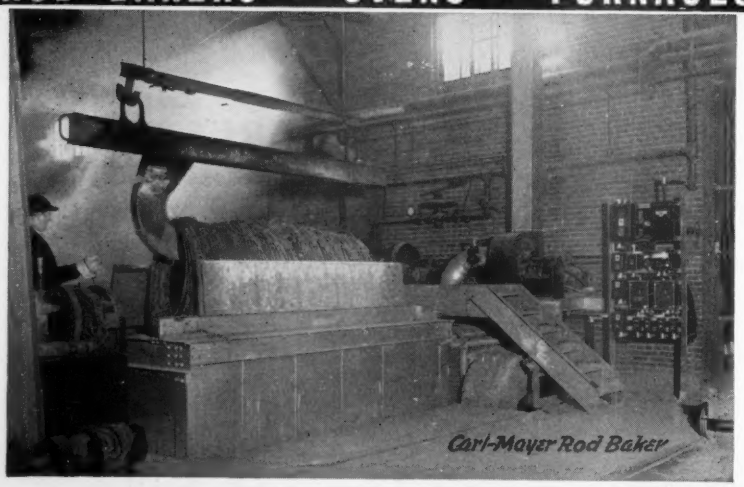
SOLE MAKERS OF WILLEY'S METAL
1342 W. Vernor Highway Detroit 1, Michigan

MORE PRODUCTION *with* CARL-MAYER HI-SPEED
ROD BAKERS - OVENS - FURNACES



Patented
TYPICAL HI-SPEED ROD BAKER — DIRECT OR INDIRECT HEAT — ANY FUEL
WRITE for BULLETIN No. 241

Growing interest in our type of equipment is evidenced by Carl-Mayer installations for such plants as:—

American Steel & Wire Co.	Eaton Mfg. Co.	Pittsburgh Tool Steel Wire Co.
Atlantic Wire Co.	Frost Steel & Wire Co. Ltd.	Republic Steel Corp.
Atlas Steel Co.	Hollup Corp.	Steel Co. of Canada
Atlas Tack Corp.	Johnson & Nephew Ltd.	Wickwire Spencer Steel Div.
California Wire Cloth Corp.	Jones & Laughlin Steel Corp.	Page Steel & Wire Co.

THE CARL-MAYER CORPORATION 3030 EUCLID AVENUE CLEVELAND, OHIO

housing time, the receiver undoubtedly will be agreeable to paying a slight charge to compensate the shipper for the added expense of the pallet and the cost of strapping the material into a unit; the carriers should cooperate by reducing the regular freight rate on returnable pallet, or arrange for a set up similar to that now in effect of making an allowance for dunnage on material shipped in open cars. Unit handling will benefit every one. It will reduce loading and unloading time, speed up warehousing and most important of all—will better protect material in transit, thus reducing claims entered against the carrier due to rough handling.

★ ★ ★

THE railroads whose claim payments for 1947 have grown to $120,000,000 against an average of $20,000,000 for the 10 years ending 1942, should be only too happy to support this program of palletizing freight shipments. Poor packaging is not the reason for material arriving at destination in a damaged condition. In most cases rough handling and the lack of modern handling equipment is the real reason for damaged material in transit. Better packaging and faster delivery at reduced cost is the goal of American Industry. This goal can only be achieved by the team work, and cooperation of all of us: the producer, public carrier and receiver. It will pay rich dividends.

★ ★ ★

The San Francisco Cable Cars and Cables

(*Continued from page* 774)

(jams a metal wedge down into the cable slot and stops the car NOW!), 3). the HAND BRAKE LEVER (forces a soft pine wooden block, replaced every three to seven days, down against each track), 4). the FOOT BRAKE (forces metal brake shoes against each wheel), 5). the GRIP LEVER.

★ ★ ★

THE all important GRIP may be compared to a vise. As the

GRIP LEVER is pulled back a metal wedge is forced down between two cams which pivot and bring the vise jaws together, grasping the cable. The GRIP (vise) jaws must be replaced weekly. This description is suitable for the bottom type grip, but on the California Street line the grip opening is on the side (as though the vise were turned 90°), and only the upper jaw is moveable.

★ ★ ★

ON the hills the conductor aids the gripman in controlling the car by; on the California system — applying the rear HAND LEVER BRAKE and/or the FOOT BRAKE; on the Municipal line— applying the brake shoes against the rear wheels by means of a HAND BRAKE CRANK. Although there are sets of control levers at each end of the cars of the California type, there is but one grip per car. This single grip is actuated when the car is travelling in one direction by a long rod from the grip to the front-end GRIP LEVER.

★ ★ ★

THE cables of the California system are operated by two 300 H.P. motors, with reduction gears, 2 cables per motor. Each cable passes around two tandem wheels, only one of which is power driven. An eight foot tension wheel rests its weight (2,800 lbs.) on a length of cable between the tandem wheels and maintains an even tension by this weight. The tandem wheels for the California-Presidio Avenue cable are 13 ft. 6 inches in diameter, the tandem wheels for the other three cables are 12 ft. in diameter.

★ ★ ★

THE three Municipal cables are powered from a 750 H.P. motor, with reduction gears. Each cable passes around two tandem 14 ft. wheels, only one of which is power driven. The wheel not power driven is moveable longitudinally and maintains an even tension on the cable by being held against the bight of the cable by a system of weights.

★ ★ ★

Next time you order pickling hooks, make sure you get your money's worth in *service* by specifying MONEL*.

For forty years, users of MONEL pickling equipment have reported many times the service life over the best of other metals tried.

If you want substantial savings in replacement and maintenance costs, switch to MONEL for all types of pickling equipment . . . tanks, baskets, chain, tie-rods, racks.

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*Reg. U. S. Pat. Off.
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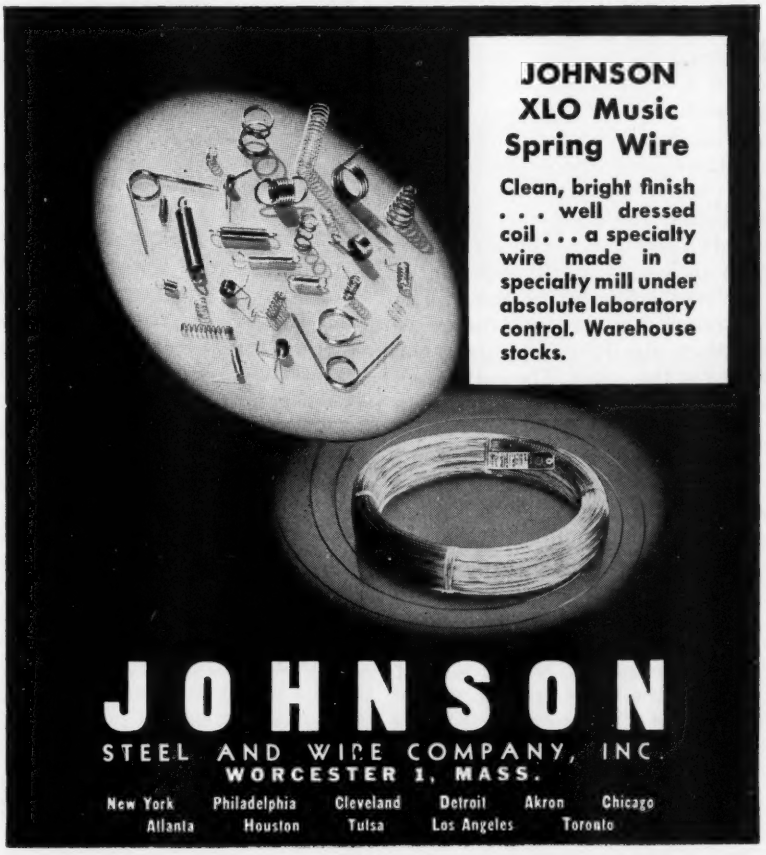
MONEL*... FOR MINIMUM MAINTENANCE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Spring Wire
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JOHNSON
STEEL AND WIRE COMPANY, INC.
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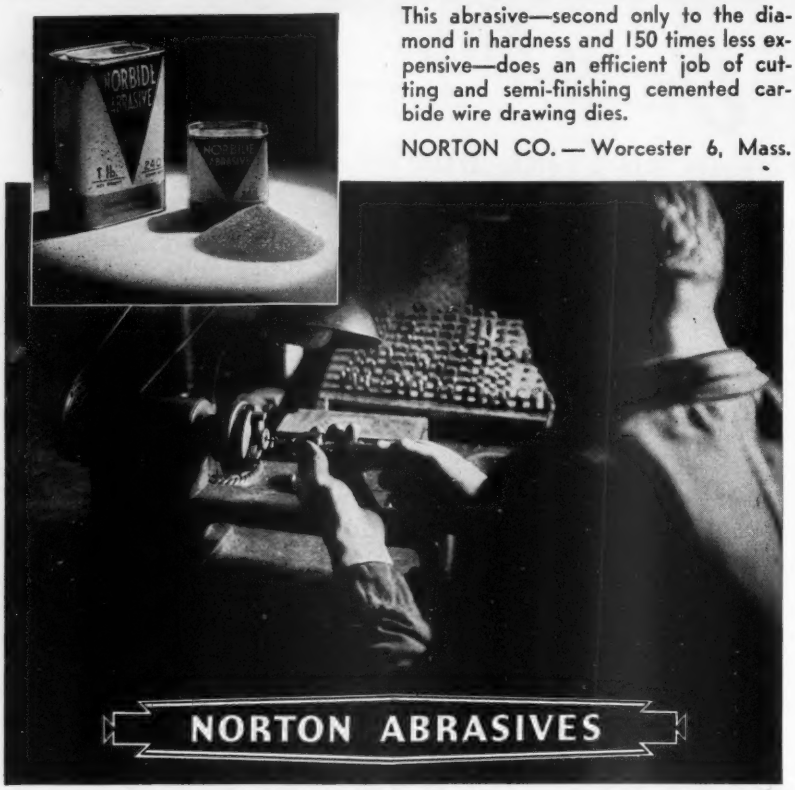
New York Philadelphia Cleveland Detroit Akron Chicago
Atlanta Houston Tulsa Los Angeles Toronto

NORBIDE Abrasive: Effective, Economical



This abrasive—second only to the diamond in hardness and 150 times less expensive—does an efficient job of cutting and semi-finishing cemented carbide wire drawing dies.

NORTON CO. — Worcester 6, Mass.

WHEN the paths of two cables cross each other, such as at Powell & California and Hyde & California; at the terminal ends of the various lines; and when shifting from one cable to another cable; the cable which is no longer to be used must be fully released and dropped from the grip. To again pick-up a cable any one of three methods may be used. The car tracks may be constructed so that they dip down and bring the grip over the cable. The cable may be forced up into the grip by a roller actuated by a lever or chain accessible in the street at the point of picking-up the cable. Or the gripman may reach down with a hooked rod and pull the cable up into the grip. To pick-up the cable on the California Street line, where the side opening type grip is used, under-ground guiding sheaves are placed where they will insert or withdraw the cable into or out of the grip at the proper time. Or the conductor pulls up from the track-side a short length of chain. The lower end of this chain is attached to a cam lever which raises the cable and at the same time moves it sideways into the side-opening of the grip.

★ ★ ★

ON the Powell Street line the gripman must frequently wait at Pine Street for the ALL CLEAR green light to be shown in the signal tower on the crest of Nob Hill at Powell and California Streets. The Powell Street cable passes under the California Street cable, and the Powell car gripman must have enough momentum on his car to carry it, without power, over the crest of the hill and over the California Street cable. The Powell car gripman must fully release and drop his cable before crossing over California Street. To regain its grip on the cable after crossing California Street, the Powell car coasts down the far side of the hill until a dip in the tracks brings the grip down over the cable and the cable may again be grasped. The Cable cars are lighted by storage batteries which are recharged daily.

U. S. Steel Opens Warehouse in Cleveland

UNITED STATES STEEL SUPPLY COMPANY played host on May 14th to more than 2,800 customers in its large, new warehouse here at 7105 Bessemer Avenue, Cleveland. **L. B. Worthington,** president of the U. S. Steel subsidiary, and **E. J. Heffner,** Cleveland district manager, were official hosts for the function. Other company officials from Chicago and other districts also participated in the open house.

★ ★ ★

THE new plant was near completion last summer when fire destroyed the former warehouse, located at 1394 East 39th Street. Operations then were started in the new facilities, and the plant has served Supply Company customers ever since.

★ ★ ★

New Processed Industrial Hydraulic Oils Folder

FOLDER describes Saf-Drive series of hydraulic oils which have recently been developed to meet the exacting demands of present day hydraulically-operated industrial equipment.

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ENTIRE series of oils processed to insure such desirable service properties as—high viscosity indices, increased oxidation stability, high demulsibility, positive lubricating value, and corrosion and rust preventive qualities. Importance of these properties fully described and illustrated.

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A COPY may be had by writing the **Swan-Finch Oil Corp.,** R. C. A. Building, West, New York 20, N. Y.

★ ★ ★

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Stannous Sulphate, used for either straw color or white liquor finishing, provides these outstanding advantages:

1. A superior, smoother coating
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Write for information on how to use Stannous Sulphate to best advantage in your liquor finishing.

METAL & THERMIT CORPORATION
120 Broadway • New York 5, N. Y.

Bethlehem Steel Company Cambria, Johnstown, Sparrows Point

(*Continued from page 761*)

CAUSES and consequences are interesting to trace. The **Cambria** rod mill was accompanied by a **Morgan** continuous billet mill. Through some misunderstanding the mill was ordered with a specified set of gears, but with no planning of passes. It fell to the lot of **J. W. Sheperdson,** who was in charge of the **Gautier** mills, to puzzle out a way to adapt a series of passes to the fixed roll speeds, and by the time he had done the job he was pretty well versed in roll-pass design. The situation attracted the attention of the **Morgan** people, and **Mr. Sheperdson,** as vice president of **Morgan Construction Co.,** now has more to do with rod mill design than anyone in the world.

★ ★ ★

THERE was another face in the **Gautier** picture in those days that is even better known to wire folks; it was that of one of the mechanics, who bore the name **Louis Winkler.**

★ ★ ★

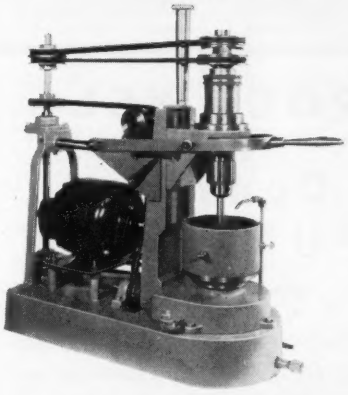
IN writing a story of this sort, if it is to be readable, and not force the reader into mental acrobatics, it is not enough to have the simple facts and present them chronologically, nor even to stick to one topography till its possibilities are exhausted. The writer must exercise a choice not only over the material but over the sequence of presentation. I am going to drop the Johnstown mill now and swing to Sparrows Point for a while, and to link them together I will turn to **Jack Mordica.**

★ ★ ★

JACK'S is a name that connotes loyalty, good fellowship, understanding, a sound and practical knowledge of wire problems, willingness to be helpful and to share knowledge, an implicit belief in the aims of the WIRE ASSOCIATION, of which he was the first president, and a perfect willingness to practice what he preached. Now

NEW!

ROOS
Industrial Type LAPPING or RIPPING MACHINE for Tungsten Carbide LARGE DIES



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slit kraft or jumbo rolls for crushing and wrapping operations.

waxed cable-fillers for 2- and 3-wire non-metallic sheathed cable, varnished cambric, and shipboard cable.

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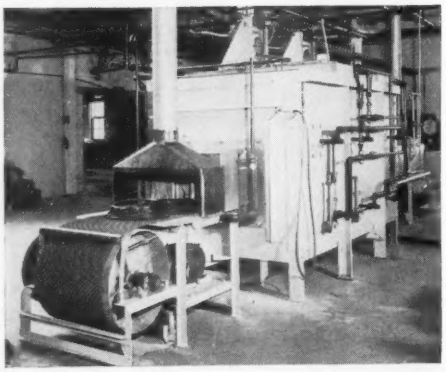
For Continuous, Uniform Annealing, Bright Annealing or Hardening Rod or Wire in Coils or on Spools.



This is one of the many Rockwell batch and continuous belt or strand types—fuel fired or electric—for any gauge or quantity of wire of any metal.

Scale-free annealing of non-ferrous coiled rod in an open gas-fired, belt conveyor furnace. Also used for bright annealing certain metals.

Bulletin 418 describes various types of Rockwell furnaces for wire heating. Write for a copy.

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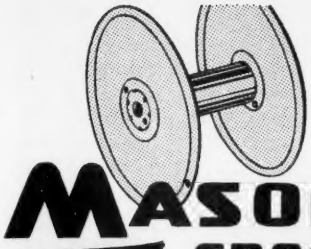
that he is gone we wish we had taken advantage of the chance while we had it, to get a full account of his wire career, but after all, what are a few dates, more or less? We know he spent his whole life in the mills, and what we have if not absolutely accurate is at least typical.

★ ★ ★

JACK was born in England in 1873 and was brought here by his mother and stepfather six years later. Going to work at 11, he saw some service in mines, and in sheet and tin-plate mills, but very soon shifted into wire, where for a long time he followed his stepfather. Those two were close friends; Jack was often registered on the pay sheets under his stepfather's name, Carter, which is one of the things that makes it so hard to trace him now. Some of his buddies knew him as **Carter,** some as **Mordica,** and he never tried to set them right. He seems to have served his apprenticeship at either **Ironton** or **Ashland,** probably rather informally as his father was foreman of the wire room, and he certainly drew wire at **Kokomo,** and at **Anderson.** In the latter town he met the girl who became Mrs. Mordica. He told somebody in late years that he came near getting out of the wire business in Anderson, and going in for real estate. That sounds like something that Mrs. Mordica might have thought up; these wives, you have to watch all the time or they'll hide your overalls.

★ ★ ★

PETER IGOE, an old time buddy, says "I know he worked at **Newcastle** in 1888 and 1889 and I think then he went to **Beaver Falls.**" I can check Beaver Falls; Jack told me of being there at the time the wire mill **(Oliver & Roberts)** was shifting from flour to lime coat. Pete thinks he went from Beaver Falls to Anderson, which checks pretty well. From Anderson he probably went to Kenova, **(Independent Steel & Wire Co.)** with possibly a side trip to Fostoria. **Fritz Lindstrom** swears he saw him at **Gulf States,**



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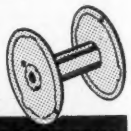

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but nobody checks on that. But now we can pin him down. In 1911 he left the superintendency at Kenova and became night foreman of the wire room at Johnstown; in 1914 he was general foreman, and before Sparrows Point was built he was assistant superintendent.

★ ★ ★

CONSTRUCTION of the **Sparrows Point** rod and wire mill started early in 1925 alongside Bear Creek. **Jack Mordica** was detached from Johnstown and participated in the planning of the new plant. The rod mill was ordered as a straight continuous **Morgan** mill. This was a type already obsolete, but Jack felt his responsibilities keenly and was playing it safe. He wanted what he had worked with at Johnstown. It was the same impulse, I suppose, that made him ignore continuous drawing. I don't think he ever admitted a change of mind on that; it was a very human trait, and Jack was human. I think this was the first all-geared rod mill; it finished at 3500 fpm. It was changed later from two to three strand, and as the trade slowly took to continuous machines and wanted heavier bundles, the billet size was stepped up to two inches. It might be well to say here that the second rod mill at Sparrows Point, bought in 1937, was ultramodern, with loops, and with power and heating capacity for four-strand operation. In 1940 a duplicate finishing train was installed, the original 6-stand finisher having been double strand, and the mill went onto four-strand operation. Billets run to 900 lb., finishing speed at the 21st stand is 4500 ft., and concrete bar is rolled in a variety of sizes.

BORAX

More shops are turning to this most satisfactory coating material. It is easy and safe to handle. Does not create dust nuisance.

Pins of wire which have been properly washed after the acid dip, sul coated and then coated with Borax have been satisfactorily drawn after remaining in storage for several weeks.

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★ ★ ★

THE original cleaning house was of strictly orthodox type steam jib, wooden tubs, truck baker, but did not last long. The new mill was on made ground, parts sank pretty badly, but none so badly as the cleaning house floor. When rebuilding became imperative it was done as a straight-line job, with a very large con-

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AURORA ILLINOIS

crete tub lined with brick laid up in sulphur. This idea came from **Bob Gilmore** of **Williamsport Wire Rope,** which was closely linked with **Bethlehem** at that time. Bob picked it up through his wire rope connection with Texas-Gulf Sulphur Co. and proved it out at Williamsport; Bob's chief engineer **Clyde Kiess** went to Sparrows Point and managed the ticklish job of pouring the sulphur. A second line was put in, more as a stand-by than anything else, as the one line had enough capacity. When the new rod and wire mills were built there was a shift to steel tubs with rubber lining, and mechanical agitation was installed.

★ ★ ★

THE wire mill, which turns out a pretty full line of coarse dry-drawn wires in all plain carbon grades and in sizes from .650 to .034, was set up originally with **Vaughn** single-hole bulls exclusively; later some double-decking was done, and in recent years there has been a rather extensive replacement of single by continuous machines, so that the count today runs about like this: 59 continuous, 40 double-deckers, 20 single deck, and 5 bulls. Welding is done at the machines.

★ ★ ★

HANDLING is completely modernized. Cleveland controlled hairpins take care of rod stock; flash bakers have eliminated the baker truck, ram trucks feed the machines, drawn wire moves on skids by lift truck, and there is a system of stocking in warehouse and delivering alongside car by means of cages built up of tubing and designed for stacking in multiple heights.

★ ★ ★

THE nail mill, started in 1926 with 139 machines, now has 160 single and 7 double-blow, and three staple machines, with the usual accessories for cleaning, blueing, and coating. Two 36-wire galvanizing units were installed, one for wiped, one for charcoal wire, but the latter was altered to a strand annealer when the **Beth-**

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anizer was started. This well-known electro-galvanizing process has the peculiarity of working from zinc ore rather than the metal. The zinc is leached out in the form of sulphate, and deposited from insoluble silver-lead anodes. The preliminary cleaning operations are particularly thorough, involving both acid and molten caustic. This process was inaugurated in 1933 and expanded in 1939 and again in 1942.

* * *

BARB fence was started in 1927 with 16 machines, and now has 21. Four multiple (**Holmquist**) bale tie machines were installed in 1926. At present the set-up is 16 single wire machines, and two years ago arrangements were made for continuous lead annealing in process. There are 21 straightening and cutting machines in service.

* * *

HIGH carbon naturally called for patenting, which was begun in 1930 with a **Surface Combustion** furnace. Four more have been added. Three 36-wire units air-patent, two others have lead quench optional, and there is a new double-lead unit. There are five stranders at work on wire strand and one closing machine road-guard cable.

* * *

CARL E. JOHNSON, a graduate of the Michigan College of Mines, came to Sparrows Point in 1923, and was assigned to be **Mordica's** assistant at the start of the new plant. He stepped into his place at Jack's death, and since he is about as well known as was his illustrious predecessor, I don't feel constrained to write any eulogy, nor do I think I will live to do his obituary notice unless something very heavy falls on him. I can say the same of Carl's assistant, **Roy Mackay**, a M.I.T. man who arrived just ahead of Carl, and has been at the wire mill since it started. **John Hazen** and **Ralph Sharp** have headed wire sales from the start; **Sharp**, who broke in at the Boston office after the Midvale merger brought him to Bethlehem,

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Handle heavy reels easily and safely; remove wire or cable from top or bottom, front or back of reel with
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Price $15.00
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495 pages—414 illustrations
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SEND ORDERS TO
WIRE and WIRE PRODUCTS
300 Main St., Stamford, Conn.

became **Hazen's** right hand man in 1929 and succeeded him in 1943.

★ ★ ★

THESE two wire mills, **Sparrows Point** and **Johnstown**, have worked as a team for twenty three years; one would set the pace, hold the lead for a while, then drop back and follow the other. They pioneered the various novelties in turn. **Johnstown** established the rod mill type, and did the experimental work that resulted in the choice of the new **Vaughn** blocks for the **Sparrows Point** job. **Sparrows Point** pioneered the **Tainton** process; **Johnstown** followed. **Sparrows Point** stuck out its neck on permanent tubs, and carbide dies; **Johnstown** tried out the flash baker and continuous wire machines. By cautiously following each other's leads the two mills have now come to be much alike, except for such differences as depend on spatial limitations. **Sparrows Point** has its second rod mill, of advanced design, and its rod storage system is by **Cleveland** hairpin and tramrail rather than bridge crane.

★ ★ ★

GALVANIZING at Johnstown is done on two hot-dip units of 30 wires each, and a 24-wire Bethanizing unit. Patenting is done on three 36-wire units plus a 28-wire double-lead outfit. For annealing there are three pot furnaces and ten bell furnaces working over fourteen bases. As compared with **Sparrows Point**, the **Johnstown** mill makes less nail tonnage, but goes in heavier in fence, both barb and field, having 15 machines on the latter product and 32 on barbed wire.

★ ★ ★

HAVING begun its modernizing after the advantages of continuous drawing had been abundantly proven, **Johnstown** was able to plan efficiently. The present set-up includes: 24 single-holers, 11 double-deckers, 2 three-holers, 10 four-holers, 21 six-holers, 6 seven-holers, and 4 twelve-holers, the last being accounted for by the fact that unlike its partner, **Johnstown** goes down to 36 gauge.

★ ★ ★

CUT WIRE CABLE

WIRE CUTTING

For simple wire cutting jobs, use one of the 3 New Porter *one-hand* HandKliP Cutters. They do the job in *less time* with *less effort*. Types to cut steel strapping .035" x 1¼", wire, wire rope and rods up to 3/16", ¼" annealed bolts in the thread and similar metals. Lightweight, compact, easy to carry. Adjustable for longer service.
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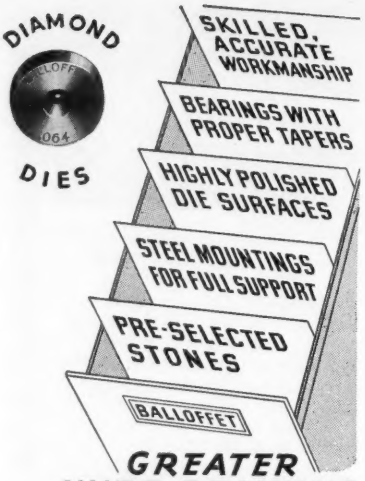

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Cubical Granules

(*Continued from page 763*)

OTHER observations made during these runs further confirmed the superiority of this improved form of granule. The degree to which the advantages of cubes may be realized in a given extruder is a function of the screw speed available. With the old type granules no increase in output occurred above an optimum screw speed, but a continued increase in output was obtainable with cubical granules by raising the screw speed as illustrated in Figure 3.

★ ★ ★

PLASTIC compound output was less affected by screw design when cubical granules were used. Tests indicated that at high screw speeds the highest output was obtained with a single flight screw having a decreasing pitch which is wide at the feed zone. A large "bite" of granules at high screw speeds is essential. With one machine, a single flight screw having a flight lead angle of 2-¾" at the feed end pushed out 168 pounds of compound per hour, while a double flight screw having a flight lead angle of 4" could only produce 138 pounds per hour.

★ ★ ★

THE new cubical granules are especially suited for the extrusion of thin wall insulation where diameter control is critical. Variation in extrusion rates, sometimes encountered from one bag of granules to the next was practically eliminated with the improved form.

★ ★ ★

THE effect of cubical granulation upon extrusion speed was more noticeable in certain compounds than in others. Generally, the slower extruding compounds showed the greatest improvement. Cubical granules of all compounds studied always proved to be superior to the old type under any given set of extruder conditions. The appearance of the extruded wire or cable in all instances was as good or better when cubes were used.

★ ★ ★

ESSENTIALLY, this new form of plastic yields a faster, more efficient extrusion with better diameter control. In addition to improving the processability, the manufacturing technique used in making these cubical granules is a further step in obtaining the most uniform product that engineering can produce. Certain of the standard Geon plastics are now available in cube form.

★ ★ ★

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Westinghouse Copper Wire Mill at Buffalo, N. Y. Part II

(*Continued from page 765*)

old identification labels. They are then stored until needed in one of the operating sections.

★ ★ ★

PR 4801—Balcony area where spools are sorted and marked and stored till needed. * * *

ROLLER-TYPE conveyors lead from the balcony to each of the several finished wire producing areas. As empty spools are needed, they are placed on a conveyor leading to the floor below. One conveyor leads to the rectangular wire rewinding and insulating section, two others lead to the enameling room, and two to the textile insulation room. Empty spools are shown on one of the conveyors in the textile insulation room in PR-4807.

★ ★ ★

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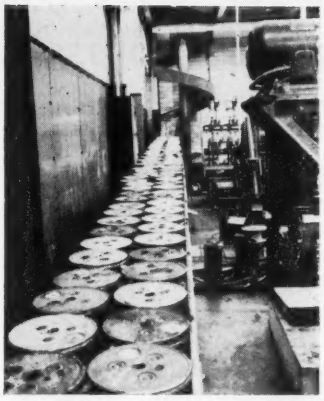

PR 4807—Empty spools shown on conveyor in textile insulation room.

AN electric hand-operated fork truck is used in the balcony area to transport crates of empty spools to and from storage. There are facilities on the balcony for repairing slightly damaged spools. Spools which are beyond repair are returned to the shipping floor for disposal.

★ ★ ★

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IMPORTANT NOTICE . . .

ON CHANGE IN CONVENTION PROGRAM

The Convention has been changed from a four to a five-day meeting because it has been found that the plant inspection trip to the Joliet mill of the American Steel and Wire Company will require a full day instead of the half day originally scheduled. Busses will leave the hotel at 8:30 A.M., sharp, Tuesday, October 18th. Luncheon will be provided at the plant by the Company.

Please refer to the revised program published elsewhere in this issue of WIRE & WIRE PRODUCTS.

THE WIRE ASSOCIATION

STAMFORD, CONNECTICUT

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Standard Industrial Compounds Co., Inc., Chicago, Ill.

COMPOUNDS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Magnus Chemical Co., Garwood, N. J.
Magnuson Products Corporation, Brooklyn, N. Y.
Miller, R. H. Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Pacific Coast Borax Corp., New York, N. Y.
Potter, Neil C., Newark, N. J.
Standard Industrial Compounds Co., Inc., Chicago, Ill.
Swift & Company, Chicago, Ill.

COPHOLDERS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

CORROSION PREVENTIVES
Angier Corp., The, Framingham, Mass.

CRANES—Wire Mill
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CUTTING TOOLS—Carbide
Adamas, Carbide Corporation, Harrison, N. J.
Carboloy Co., Inc., Detroit, Mich.
Eastern Carbide Corp., New Rochelle, N. Y.
Metal Carbides Corporation, Youngstown, Ohio.
Rusch Wire Die Corp., Croton-on-the-Hudson, New York.
Vascoloy-Ramet Corp., North Chicago, Ill.
Willey's Carbide Tool Co., Detroit, Mich.

CUTTING TOOLS—Wire
Adamas, Carbide Corporation, Harrison, N. J.
Porter, H. K., Inc., Everett, Mass.

DIAMONDS—Industrial
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Champion Diamond Co., New York, N. Y.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Vianney Wire Die Wks., New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIAMOND POWDERS—
Champion Diamond Co., New York, N. Y.
Eastern Carbide Corp., New Rochelle, N. Y.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Hyprez Division, Engis Equipment Co., Chicago, Ill.
Indiana Wire Die Co., Ft. Wayne, Ind.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIAMOND TOOLS—
Carboloy Co., Inc., Detroit, Mich.
Indiana Wire Die Co., Ft. Wayne, Ind.
Metal Carbides Corporation, Youngstown, Ohio.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIES—Carbide
(See Dies—Tungsten Carbide)

DIES—Cold Heading
Adamas, Carbide Corporation, Harrison, N. J.
Carboloy Co., Inc., Detroit, Mich.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Indiana Wire Die Co., Ft. Wayne, Ind.
Metal Carbides Corporation, Youngstown, Ohio.
Vascoloy-Ramet Corp., No. Chicago, Ill.

DIES—Diamond
Ajax Industrial Supplies, Inc., Fort Wayne, Ind
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Cochaud Wire Die Corp., New York, N. Y.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Vianney Wire Die Wks., New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIES—Extrusion
Adamas, Carbide Corporation, Harrison, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Metal Carbides Corporation, Youngstown, Ohio.
Robertson, John, Co., Brooklyn, N. Y.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Wayne Wire Die Co., Hillside, N. J.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Eyelet
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.

DIES—Pointing
Sjogren Tool and Machine Co., Auburn, Mass.

DIES—Repairs & Re-Cutting
Adamas, Carbide Corporation, Harrison, N. J.
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Detroit, Mich.
Cochaud Wire Die Corp., New York, N. Y.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Wks., New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Special Shapes, Etc.
Adamas, Carbide Corporation, Harrison, N. J.
Eastern Carbide Corp., New Rochelle, N. Y.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.

WHERE TO BUY, Continued

DIES—Tantalum Carbide
Adamas, Carbide Corporation, Harrison, N. J.
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, Ohio.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Wks., New York, N. Y.

DIES—Tube Drawing
Adamas, Carbide Corporation, Harrison, N. J.
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Wks., New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Tungsten Carbide
Adamas, Carbide Corporation, Harrison, N. J.
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, Ohio.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Wks., New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.
Willey's Carbide Tool Co., Detroit, Mich.

DRAW BENCHES—
(See MACHINERY—Draw Benches)

DRUMS—Flange Steel
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.

DRUMS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.
Watson Machine Co., The, Paterson, N. J.

DRYING EQUIPMENT—
Carl-Mayer Corp., The, Cleveland, Ohio.
Drying Systems, Inc., Chicago, Ill.
Industrial Ovens, Inc., Cleveland, Ohio.
Rockwell, W. S. Co., Fairfield, Conn.
Ross, J. O., Engineering Corp., New York, N. Y.

ENGINEERS—Consulting Hot Galvanizing
Wallace G. Imhoff Co., The, Los Angeles, Calif.

ENGINEERS—Consulting Spring Design
Carlson, Co., The, New York, N.Y.

ENGINEERS—Consulting Wire Mill
Fisher, Edward J. P., North Jackson, Ohio.
Lewis, Kenneth B., Worcester, Mass.

EQUIPMENT—Insulation Testing
Davis, R. L., Elec. Co., Wallingford, Conn.
Entwistle, James L., Co., Pawtucket, R. I.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FLUXES—Soldering
American Chemical Paint Co., Ambler, Pa.

FOAM PRODUCING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Parkin, Wm. M. Co., Pittsburgh, Pa.

FRICTION PAY-OFF STANDS—
Industrial Ovens, Inc., Cleveland, Ohio.

FURNACES—Annealing
Ajax Electric Co., Inc., Philadelphia, Pa.
Carl-Mayer Corp., The, Cleveland, Ohio.
Drying Systems, Inc., Chicago, Ill.
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Niagara Falls, N. Y.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engr. Co., Cleveland, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Automatic
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio.
Surface Combustion Corp., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Brazing
Electric Furnace Co., Salem, Ohio.
Rockwell, W. S., Co., Fairfield, Conn.

FURNACES—Bright Annealing
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Niagara Falls, N. Y.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Electric
Eisler Engineering Co., Newark, N. J.
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Niagara Falls, N. Y.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engineering Co., The, Cleveland, Ohio.

FURNACES—Galvanizing Equipment
Ajax Electric Co., Inc., Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio.
Rockwell, W. S., Co., Fairfield, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engineering Co., The, Cleveland, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Hard'ing & Temp'ing
Ajax Electric Co. Inc., Philadelphia, Pa.
Carl-Mayer Corp., The, Cleveland, Ohio.
Drying Systems, Inc., Chicago, Ill.
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Niagara Falls, N. Y.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engr. Co., The, Cleveland, Ohio.

FURNACES—Lead Melting
Electric Furnace Co., Salem, Ohio.
Robertson, John, Co., Brooklyn, N. Y.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Non-Oxidizing
Ajax Electric Co., Inc., Philadelphia, Pa.
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Normalizing
Ajax Electric Co., Inc., Philadelphia, Pa.
Carl-Mayer Corp., The, Cleveland, Ohio.
Drying Systems, Inc., Chicago, Ill.
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Niagara Falls, N. Y.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Pot (Oil, Gas, Electric)
Ajax Electric Co., Inc., Philadelphia, Pa.

FURNACES—Resistance Heating, Strand
Trauwood Engineering Co., Cleveland, Ohio.

FURNACES—Salt Bath
Ajax Electric Co., Inc., Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corporation, Toledo, O.
Trauwood Engineering Co., The, Cleveland, Ohio.

FURNACES—Wire, Strip & Sheet
Carl-Mayer Corp., The, Cleveland, Ohio.
Eisler Engineering Co., Newark, N. J.
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Niagara Falls, N. Y.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corporation, Toledo, O.
Trauwood Engineering Co., The, Cleveland, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

GALVANIZING EQUIPMENT—
Steel Equipment Co., Cleveland, Ohio.
Wean Equipment Corp., Cleveland, Ohio.

GALVANIZING KETTLES—
National Annealing Box Co., Washington, Penna.

GRINDERS—Roll
Norton Co., The, Worcester, Mass.

HAMMERS—Swaging
Sjogren Tool and Machine Co., Auburn, Mass.

HOISTS—Electric Travelling
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, Ohio.

HOOKS—Pickling and Liming
Gordon, Clark E., Detroit, Mich.
Youngstown Welding & Engineering Co., Youngstown, Ohio.

INHIBITORS—Pickling
American Chemical Paint Co., Ambler, Pa.
Oakite Products, Inc., New York, N. Y.
Parkin, Wm. M., Co., Pittsburgh, Pa.

INSULATING LACQUERING SYSTEMS—Continuous
American Insulating Machine Co., Phila., Pa.
Industrial Ovens, Inc., Cleveland, Ohio.

INSULATING MATERIALS—
Du Pont de Nemours, E. I., Co., Wilmington, Del.
Martin, Glenn L., Company, Baltimore, Md.
Owens Corning Fiberglas Corp., Toledo, O.
Twitchell, E. W., Philadelphia, Pa.

LATHES—Die Reaming
Carboloy Co., Inc., Detroit, Mich.
Morgan Construction Co., Worcester, Mass.
Roos, Tool & Mfg. Co., Montclair, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Machine Co. Waterbury, Conn.

LIME—
Warner Co., Philadelphia and Bellefonte, Pa.

LININGS—Acid and Alkali Proof
Haveg Corp., Newark, Del.
Sauereisen Cements Co., Pittsburgh, Pa.

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Inc., Chicago, Ill.

LUBRICANTS—Wire Drawing
(See Compounds—Wire Drawing)

LUMBER—Wire Mill, for lagging and car blocking.
North Anson Reel Co., North Anson, Maine

MACHINERY—Armoring (Cable, Wire Hose)
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Bead Wrapping
Terkelsen Machine Co., Boston, Mass.

MACHINERY—Braiding
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Wire & Textile Mach'y, Inc., Pawtucket, R. I.

MACHINERY—Brazing
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Bunching
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Cable, Electric
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Chain Making
Nilson, A. H. Machine Co., The, Bridgeport, Conn.

MACHINERY—Cable, Rope Closing
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coil Winding
Boyd & Sons Manufacturing Co., Phila., Pa.
Rockwell, W. S., Co., Fairfield, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.

WHERE TO BUY, Continued

MACHINERY—Coilers
Boyd & Sons Manufacturing Co., Phila., Pa.
Eisler Engineering Co., Newark, N. J.
Entwistle, Jas. L. Co., Pawtucket, R. I.
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (used), New York, N. Y.
New England Butt Co., Providence, R. I.
Ruesch, H. J. Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.
Wean Equipment Corp., Cleveland, Ohio.
Wire & Textile Machinery, Inc., Pawtucket, R. I.

MACHINERY—Copper Wire Drawing and Rolling
Aetna-Standard Engineering Co., Youngstown, Ohio.
American Insulating Mach'y Co., Phila., Pa.
National Machinery Exchange (used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cutting
Eisler Engineering Co., Newark, N. J.
Lewis Machine Co., The, Cleveland, Ohio.
Mettler Machine Tool, Inc., New Haven, Conn.
National Mach'y Exch. (Used) New York, N. Y.
Nilson Machine Co., A. H., Bridgeport, Conn.
Porter, H. K., Inc., Everett, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Die Making
Carboloy Co., Inc., Detroit, Mich.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Roos, Tool & Mfg. Co., Montclair, N. J.
Wayne Wire Die Co., Hillside, N. J.

MACHINERY—Draw Benches
Aetna-Standard Engineering Co., Youngstown, Ohio.
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Edging
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.
Industrial Ovens, Inc., Cleveland, Ohio.
Rockwell, W. S., Co., Fairfield, Conn.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Extruding
National Erie Co., Erie, Pa.
Robertson, John, Co., Brooklyn, N. Y.
Royle, John, & Sons, Paterson, N. J.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Fence
Blashill, Arthur, Woodstock, Ont., Canada.
Glader, Wm., Machine Works, Chicago, Ill.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Filament Coil Winding
Eisler Engineering Co., Newark, N. J.

MACHINERY—Flat Wire
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Galvanizing
(See Galvanizing Equipment)

MACHINERY—Galvanizing Wire
Sleeper & Hartley, Inc., Worcester, Mass.
Steel Equipment Co., Cleveland, Ohio.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wean Equipment Corp., Cleveland, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

MACHINERY—Gang Winders
Entwistle, Jas. L. Co., Pawtucket, R. I.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., The, Worcester, Mass.

MACHINERY—Insulating
American Insulating Mach'y Co., Phila., Pa.
National Erie Co., Erie, Pa.
New England Butt Co., Providence, R. I.
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lead Encasing Presses, etc.
Robertson, John Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
Robertson, John Co., Brooklyn, N. Y.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Looms, Wire Weaving
Bruckner-Mitchell, Inc., New York, N. Y.

MACHINERY—Magnet Wire
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Material Handling
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MACHINERY—Measuring Wire & Cable
Durant Mfg. Co., Milwaukee, Wis.
Entwistle, Jas. L. Co., Pawtucket, R.I.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Eastern Nail Co., Providence, R. I.
Glader, Wm., Machine Works, Chicago, Ill.
National Mach'y Exch. (Used), New York, N.Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Panning
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Perth Amboy, N. J.
Wire & Textile Machinery, Inc., Pawtucket, R.I

MACHINERY—Pickling
Gordon, Clark E., Detroit, Mich.
Youngstown Welding & Engineering Company, Youngstown, Ohio.

MACHINERY—Pointing
Aetna-Standard Engineering Co., Youngstown, Ohio.
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York, N.Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry & Mach. Co., Trenton, N.J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Rod Mill
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Rolling Mill
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York, N.Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Rubber Insulating
Royle, John & Sons, Paterson, N. J.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Rubber Tubing and Straining
New England Butt Co., Providence, R. I.
Royle, John & Sons, Paterson, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Screw Wire
National Mach'y Exch. (Used), New York, N.Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Special
American Insulating Mach'y Co., Phila, Pa.
Bruckner-Mitchell, Inc., New York, N. Y.
Davis, R. L. Electric Co., Wallingford, Conn.
Eastern Nail Co., Providence, R. I.
Emory, Robert J., Co., Newark, N. J.
Entwistle, Jas. L. Co., Pawtucket, R. I.
New England Butt Co., Providence, R. I.
Ruesch, H. J. Machine Co., Newark, N. J.
Scudder, E. J., Fdry & Mach. Co., Trenton, N.J.
Sjogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Spooling
American Insulating Mach'y Co., Phila., Pa.
Boyd & Sons Manufacturing Co., Phila., Pa.
Davis, R. L. Electric Co., Wallingford, Conn.
Eisler Engineering Co., Newark, N. J.
Emory, Robert J., Co., Newark, N. J.
Entwistle, Jas. L. Co., Pawtucket, R. I.
National Mach'y Exch. (Used), New York, N.Y.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Steel Equipment Co., Cleveland, Ohio.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury, Conn.
Watson Machine Co., Paterson, N. J.
Wean Equipment Corp., Cleveland, Ohio.
Wire & Textile Mach'y, Inc., Pawtucket, R. I.

MACHINERY—Spring Making
National Mach'y Exch. (Used), New York, N.Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Lewis Machine Co., The, Cleveland, Ohio.
Mettler Machine Tool Co., New Haven, Conn.
National Mach'y Exch. (Used), New York, N.Y.
Nilson, A. H. Machine Co., Bridgeport, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Stranding
Hughesville Machine & Tool Co., Hughesville, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Aetna-Standard Engineering Co., Youngstown, Ohio.
Ruesch, H. J., Machine Co., Newark, N. J.
Steel Equipment Co., Cleveland, Ohio.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Swaging
National Mach'y Exch. (Used), New York, N.Y
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Waterbury-Farrel Foundry & Machine Co. Waterbury, Conn.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Testing Physical
Dillon, W. C. & Co., Inc., Chicago, Ill.
Eberbach & Son Co., Ann Arbor, Mich.
Scott Testers, Inc., Providence, R. I.

MACHINERY—Testing Equipment—Sparkers
Davis, R. L. Elec. Co., Wallingford, Conn.
Entwistle, Jas. L., Pawtucket, R. I.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Tinning Wire
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Steel Equipment Co., Cleveland, Ohio.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
Ruesch, H. J., Machine Co., Newark, N. J.

MACHINERY—Welding Wire
Eisler Engineering Co., Newark, N. J.
Micro Products Co., Chicago, Ill.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Winding
American Insulating Mach'y Co., Phila., Pa.
Davis, R. L. Electric Co., Wallingford, Conn.
Eisler Engineering Co., Newark, N. J.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Mill Supply, Pawtucket, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

WHERE TO BUY, Continued

MACHINERY—Wind-up (Constant Tension, Variable Speed)
Aetna-Standard Engineering Co., Youngstown, Ohio.
Davis, R. L. Electric Co., Wallingford, Conn.
Industrial Ovens, Inc., Cleveland, Ohio.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Bending
Eisler Engineering Co., Newark, N. J.

MACHINERY—Wire Drawing
Aetna-Standard Engineering Co., Youngstown, Ohio.
American Insulating Mach'y Co., Phila., Pa.
Eisler Engineering Co., Newark, N. J.
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry & Mach. Co., Trenton, N.J.
Sleeper & Hartley, Inc., Worcester, Mass.
Steel Equipment Co., Cleveland, Ohio.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co. Waterbury, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Wire Forming
Eisler Engineering Co., Newark, N. J.
National Mach'y Exch. (Used), New York, N.Y.
Nelson Machine Co., A. H., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wood Screw
National Mach'y Exch. (Used), New York, N.Y.

MACHINERY—Wrapping Straight Lengths and Tubing
Terkelsen Machine Co., Boston, Mass.

MACHINERY—Wrapping Wire Coils
Angier Corporation, Framingham, Mass.
Terkelsen Machine Co., Boston, Mass.

MATERIAL HANDLING EQUIPMENT
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MATERIAL—Resistance Heating Strand
Trauwood Engineering Co., Cleveland, Ohio.

MILLS—Tandem, Rolling & Edging
Torrington Mfg. Co., Torrington, Conn.

NAILS—Wire
American Steel & Wire Co., Cleveland, Chicago, New York.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling, John A. Sons Co., Trenton, N. J.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire-Spencer Steel Division of Colorado Fuel & Iron Corp., Buffalo, N. Y.
U. S. Steel Export Co., New York, N. Y.

NICKEL SILVER AND PHOSPHOR BRONZE—Rod, Wire and Strip
Eastwood-Nealley Corp., Belleville, N. J.
Hudson Wire Co., Ossining, N. Y.

OVENS—Cable Lacquering
American Insulating Mach'y Co., Phila., Pa.
Industrial Ovens, Inc., Cleveland, Ohio.
Rockwell, W. S., Co., Fairfield, Conn.

OVENS—Dehydrogenizing
Carl-Mayer Corp., The, Cleveland, Ohio.
Industrial Ovens, Inc., Cleveland, Ohio.
Rockwell, W. S., Co., Fairfield, Conn.

OVENS—Industrial
Carl-Mayer Corp., The, Cleveland, Ohio.
Drying Systems, Inc., Chicago, Ill.
Industrial Ovens, Inc., Cleveland, Ohio.
Rockwell, W. S., Co., Fairfield, Conn.
Ross, J. O., Engr. Corp., New York, N Y

OVENS—Welding Rod Coating
Carl-Mayer Corp., The, Cleveland, Ohio.
Drying Systems, Inc., Chicago, Ill.
Industrial Ovens, Inc., Cleveland, Ohio.
Rockwell, W. S., Co., Fairfield, Conn.
Ross, J. O., Engr. Corp., New York, N. Y.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.

PANS—Lead and Spelter
National Annealing Box Co., Washington, Pa.

PANS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

PAPER—Creped Wrapping
Angier Corp., The, Framingham, Mass.
Crepe-Kraft Company, The, Division National Waterproof Papers, Inc., Newark, N. J.
Terkelsen Machine Co., Boston, Mass.

PAPER—For Coil Wrapping and Corrosion Prevention
Angier Corporation, The, Framingham, Mass.
Crepe-Kraft Company, The, Division National Waterproof Papers, Inc., Newark, N. J.
Terkelsen Machine Co., Boston, Mass.

PAPER TESTERS—
Scott Testers, Inc., Providence, R. I.

PATENT ATTORNEYS—
Lancaster, Allwine & Rommel, Washington, D.C.

PICKLING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Oakite Products, Inc., New York, N. Y.
Parkin, Wm. M., Co., Pittsburgh, Pa.

PICKLING—Hooks, etc. Acid Resisting
Gordon, Clark E., Detroit, Mich.
Youngstown Welding & Engineering Company, Youngstown, Ohio.

PICKLING TANK LININGS—
Haveg Corp., Newark, Del.
Sauereisen Cements Co., Pittsburgh, Pa.

PIPES & FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.

PLASTIC TESTERS—
Scott Testers, Inc., Providence, R. I.

PNEUMATIC CYLINDERS
Entwistle, James L. Co., Pawtucket, R. I.

POTS—Lacquer
Industrial Ovens, Inc., Cleveland, Ohio.

POTS—Lead Melting
National Annealing Box Co., Washington, Pa.
Robertson, John, Co., Brooklyn, N. Y.

POWDER—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Potter, Neil C., Newark, N. J.
Standard Industrial Compounds Co., Inc., Chicago, Ill.

PRESSES—Hydraulic and Mechanical
Robertson, John, Co., Brooklyn, N. Y.

PRESSES—Lead
Robertson, John, Co., Brooklyn, N. Y.

PRESSURE VESSELS—
National Annealing Box Co., Washington, Pa.

PULLERS AND GRIPS—For Wire
Morgan Construction Co., Worcester, Mass.
Scudder, E. J. Fdry & Mach. Co., Trenton, N.J.
Sjogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wean Equipment Corp., Cleveland, Ohio.

PUMPS—Hydraulic
Robertson, John, Co., Brooklyn, N. Y.

REEL AND TENSION STANDS—
Davis, R. L. Electric Co., Wallingford, Conn.
Entwistle, James L., Co., Pawtucket, R. I.
Industrial Ovens, Inc., Cleveland, Ohio.
Roll-a-Reel, Cincinnati, Ohio
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS & SPOOLS—Drawn Aluminum Alloy
Acrometal Products, Inc., Minneapolis, Minn.
Hubbard Spool Co., Chicago, Ill.

REELS & SPOOLS—Annealing and Stranding
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

REELS & SPOOLS—Collapsible
Entwistle, Jas. L. Co., Pawtucket, R. I.

REELS & SPOOLS—Plastic
Hubbard Spool Company, Chicago, Ill.

REELS & SPOOLS—Steel
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Providence, R. I.
Mason Can Company, Providence, R. I.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

REELS AND SPOOLS—Shipping and Shop
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg., Co., The, Hazardville, Conn.
Clark, J. L., Mfg., Co., Rockford, Ill.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.
Mason Can Company, Providence, R. I.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.
North Anson Reel Co., North Anson, Maine.

REELS & SPOOLS—Wooden
Acrometal Products, Inc., Minneapolis, Minn.
American Woodworking Co., Chicago, Ill.
Bridge Mfg. Co., Inc., The, Hazardville, Conn.
Durkee Mfg. Co. Pine River, Minn
North Anson Reel Co, North Anson, Maine.

REELS—Metal Bound
Durkee Mfg. Co., Pine River, Minn.
Hubbard Spool Co., Chicago, Ill.
North Anson Reel Co., North Anson, Maine.

REELS—Takeoff
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg., Co., The, Hazardville, Conn.
Clark, J. L., Mfg. Co., Rockford, Ill.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.
North Anson Reel Co., North Anson, Maine.

REELS—Vulcanizing & Impregnating
Apco Mossberg Co., Attleboro, Mass.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

REELS—Wire Drawing
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

REELS—Wire Mill
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg., Co., The, Hazardville, Conn.
Durkee Mfg. Co., Pine River, Minn.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.
Mason Can Company, Providence, R. I.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.
North Anson Reel Co., North Anson, Maine.

REFRACTORIES—High Temperature
Norton Company, Worcester, Mass.

RESISTANCE HEATING—Annealing, Patenting, Etc.
Trauwood Engr. Co., Cleveland, Ohio.

ROD BAKERS—
Carl-Mayer Corp., The, Cleveland, Ohio.
Drying Systems, Inc., Chicago, Ill.
Rockwell, W. S., Co., Fairfield, Conn.
Ross, J. O., Engineering Corp., New York, N. Y.

RODS—Nickel Alloy
Eastwood Nealley Corp, Belleville, N. J.
International Nickel Co., Inc., New York, N.Y.

RODS—Stainless Steel
Armco Steel Corp., The, Middletown, Ohio.

RODS—Wire—Non-Ferrous
Eastwood Nealley Corp., Belleville, N. J.
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.

RODS—Wire, Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's John A., Sons Co., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

WHERE TO BUY, Continued

ROPE—Wire
American Steel & Wire Company, Cleveland, Chicago, New York.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Roebling's John A., Sons Co., Trenton, N. J.
U. S. Steel Export Co., New York, N. Y.
Wickwire-Spencer Steel, Division of Colorado Fuel & Iron Corp., Buffalo, N. Y.

RUBBER AND RUBBER COMPRESSION TESTERS—
Scott Testers, Inc., Providence, R. I.

RUST PROOF COMPOUNDS—
(See Compounds—Rust Preventing)

RUST REMOVING COMPOUNDS—
(See Compounds—Rust Preventing)

SATURATION SYSTEMS—
Industrial Ovens, Inc., Cleveland, Ohio.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y Inc., Pawtucket, R. I.

SHEET—Steel
Armco Steel Corp., The, Middletown, Ohio.
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's, John A., Sons Co., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

SOAPS—Industrial and Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H. Co., Inc., Homer, N. Y.
Potter, Neil C., Newark, N. J.
Standard Industrial Compounds Co., Inc., Chicago, Ill.
Swift & Company, Chicago, Ill.

SOLVENT RESIN SYSTEMS—Experimental
Industrial Ovens, Inc., Cleveland, Ohio.

STAMPINGS—Steel
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRIP—Brass and Non-Ferrous
Hudson Wire Co., Ossining, N. Y.

STRIP—Steel
Armco Steel Corp., The, Middletown, Ohio.
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Roebling's, John A., Sons Co., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

SWIFTS—Take-off
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Watson Machine Co., Paterson, N. J.

TANKS—Compound
Atlas Mineral Products Co. of Pa., Mertztown, Pa.
Haveg Corp., Newark, Del.
Watson Machine Co., Paterson, N. J.

TANKS—Pickling
Haveg Corp., Newark, Del.
Rockwell, W. S., Co., Fairfield, Conn.
Sauereisen Cements Co., Pittsburgh, Pa.

TANKS—Steel
Mossberg Pressed Steel Corp., Attleboro, Mass.
Rockwell, W. S., Co., Fairfield, Conn.
National Annealing Box Co., Washington, Pa.

TINSEL—Cords, Decorative
Hudson Wire Co., Ossining, N. Y.
Montgomery Co., The, Windsor Locks, Cohn.
North American Philips Co., Inc., New York, New York

TINSEL—Electric Conductor
Hudson Wire Co., Ossining, N. Y.
Montgomery Co., The, Windsor Locks, Conn.
North American Philips Co., Inc., New York, New York

TINSEL—Electric Resistance
Hudson Wire Co., Ossining, N. Y.
Montgomery Co., The, Windsor Locks, Conn.
North American Philips Co., Inc., New York, New York

TINSEL—Lame, Silver and False Gold
Hudson Wire Co., Ossining, N. Y.
Montgomery Co., The, Windsor Locks, Conn.
North American Philips Co., Inc., New York, New York

TINSEL—Thread, Silver and False Gold
Hudson Wire Co., Ossining, N. Y.
Montgomery Co., The, Windsor Locks, Conn.
North American Philips Co., Inc., New York, New York

TINSEL—Thread, Decorative
Hudson Wire Co., Ossining, N. Y.
Montgomery Co., The, Windsor Locks, Conn.
North American Philips Co., Inc., New York, New York

TOOLS—Wire Cutting
Porter, H. K., Inc., Everett, Mass.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

TRAVERSES—For Reels
Entwistle, James L. Co., Pawtucket, R. I.
Hubbard Spool Company, Chicago, Ill.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

TRAVERSE MECHANISMS—
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc., Pawtucket, R. I.

TUBE BENDERS AND FORMERS—
Ruesch, H. J., Machine Co., Newark, N. J.

VALVES AND FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.

VULCANIZERS—
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS—
American Insulating Mach'y Co., Phila., Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.

WELDERS—Spot and Butt
Eisler Engineering Co., Newark, N. J.
Micro Products Co., Chicago Ill.

WIND-UP AND UNWIND SYSTEMS—Continuous
American Insulating Mach'y Co., Phila., Pa.
Davis R. L. Electric Co., Wallingford, Conn.
Entwistle, James L., Co., Pawtucket, R. I.
Industrial Ovens, Inc., Cleveland, Ohio.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc., Pawtucket, R. I.

WIRE—Aluminum
Aluminum Co. of America, Pittsburgh, Pa.
Malin & Co., Cleveland, Ohio.

WIRE—Cast
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Cold Heading
Armco Steel Corp., The, Middletown, Ohio.
American Steel & Wire Co., Cleveland-Chicago, New York.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's, John A., Sons Co., Trenton, N. J.
U. S. Steel Export Co., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Electric
Hudson Wire Co., Ossining, N. Y.
Malin & Co., Cleveland, Ohio.

WIRE—Enameled for Coils
North American Philips Co., Inc., New York, New York
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Manufacturers
Armco Steel Corp., The, Middletown, Ohio.
American Steel & Wire Co., Cleveland-Chicago, New York.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div. of Colorado Fuel & Iron Corp., Buffalo, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Music
American Steel & Wire Co., Cleveland-Chicago, New York
Columbia Steel Co., San Francisco, Calif.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Malin & Co., Cleveland, Ohio.
U. S. Steel Export Co., New York, N. Y.
Wickwire-Spencer Steel Division of Colorado Fuel & Iron Corp., Buffalo, N. Y.

WIRE—Nickel & Nickel Alloy
Eastwood-Nealley Corp., Belleville, N. J.
International Nickel Co., Inc., New York, N.Y.

WIRE—Nickel Silver and Phosphor Bronze
Eastwood-Nealley Corp., Belleville, N. J.
Hudson Wire Co., Ossining, N. Y.
Malin & Co., Cleveland, Ohio.

WIRE—Non-Ferrous to Specification for Special Purposes
Eastwood-Nealley Corp., Belleville, N. J.
Hudson Wire Co., Ossining, N. Y.
North American Philips Co., Inc., New York, New York.
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Spring
American Steel & Wire Co., Cleveland-Chicago, New York.
Armco Steel Corp., The, Middletown, Ohio.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Indiana.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Keystone Steel & Wire Co., Peoria, Ill.
U.S. Steel Export Co., New York, N. Y.
Wickwire-Spencer Steel Division of Colorado Fuel & Iron Corp., Buffalo, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Stainless Steel
American Steel & Wire Co., Cleveland-Chicago, New York
Armco Steel Corp., The, Middletown, Ohio.
Columbia Steel Co., San Francisco, Calif.
Firth Sterling Steel & Carbide Co., McKeesport, Pa.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.
U. S. Steel Export Co., New York, N. Y.

WIRE—Steel—Also Coppered Steel—Also Galvanized Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Keystone Steel & Wire Co., Peoria, Ill.
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Straightening and Cutting—
Pittsburgh Cut Wire Co., Pittsburgh, Pa.
Wickwire Brothers, Inc., Cortland, N. Y.

WIRE—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

WIRE CLOTH—Industrial
Roebling's John A., Sons Co., Trenton, N. J.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire-Spencer Steel Division of Colorado Fuel & Iron Corp., Buffalo, N. Y.

WIRE TESTERS—
Scott Testers, Inc., Providence, R. I.

WIRE, WEAVING—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.

WRAPPING PAPER—Creped
Angier Corporation, Framingham, Mass.
Crepe-Kraft Company, The, Division National Waterproof Papers, Inc., Newark, N. J.

YARNS & TAPES—
Du Pont de Nemours, E. I., Co., Wilmington, Delaware
Owens Corning Fiberglas Corp., Toledo, Ohio.
Twitchell, E. W., Philadelphia, Pa.

YARN TESTERS—
Scott Testers, Inc., Providence, R. I.

The WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON 3, NEW JERSEY, U. S. A.

WATSON

ELECTRICAL WIRE AND CABLE, WIRE ROPE AND CORDAGE MACHINERY

"SHAFTLESS" COILING-REWINDER 50″/24″ — TYPE "HMT"

PATENT PENDING

Available in two speed ranges, one for Insulated Wire and Cable and one for Wire Rope, this unit fills the long felt need for a compact motorized Coiling-Rewinder which offers the following OUTSTANDING ADVANTAGES:

NEW SHAFTLESS DESIGN, fully ball bearing, very rugged for heavy duty. Reduces reel entrance and exit time to an absolute minimum. Permits rapid adjustment for any reel width within range.

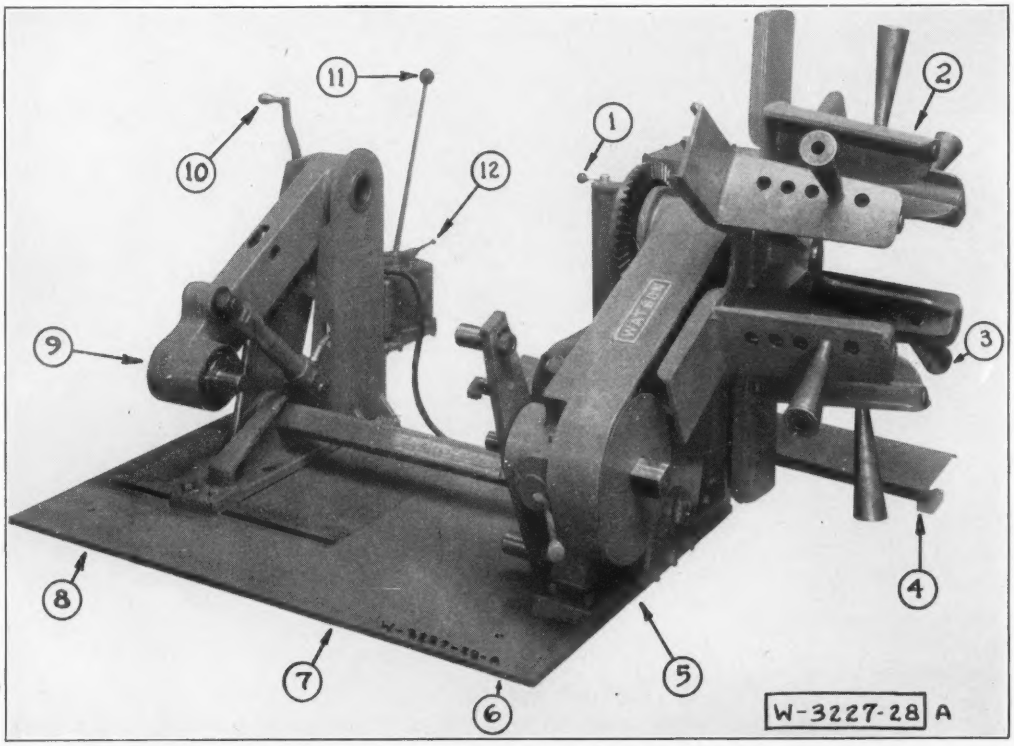
SAFETY is insured by the elimination of heavy reel shaft handling which does away with the possibility of accidental injury to the operator.

HYDRAULIC LIFT, functions with the greatest ease and provides for controlled lowering of reel to floor.

DRIVE ALWAYS IN MESH regardless of drive arm position, permits reeling at any height from floor. Only a very few pump strokes are required to raise reel clear of floor, ready for winding.

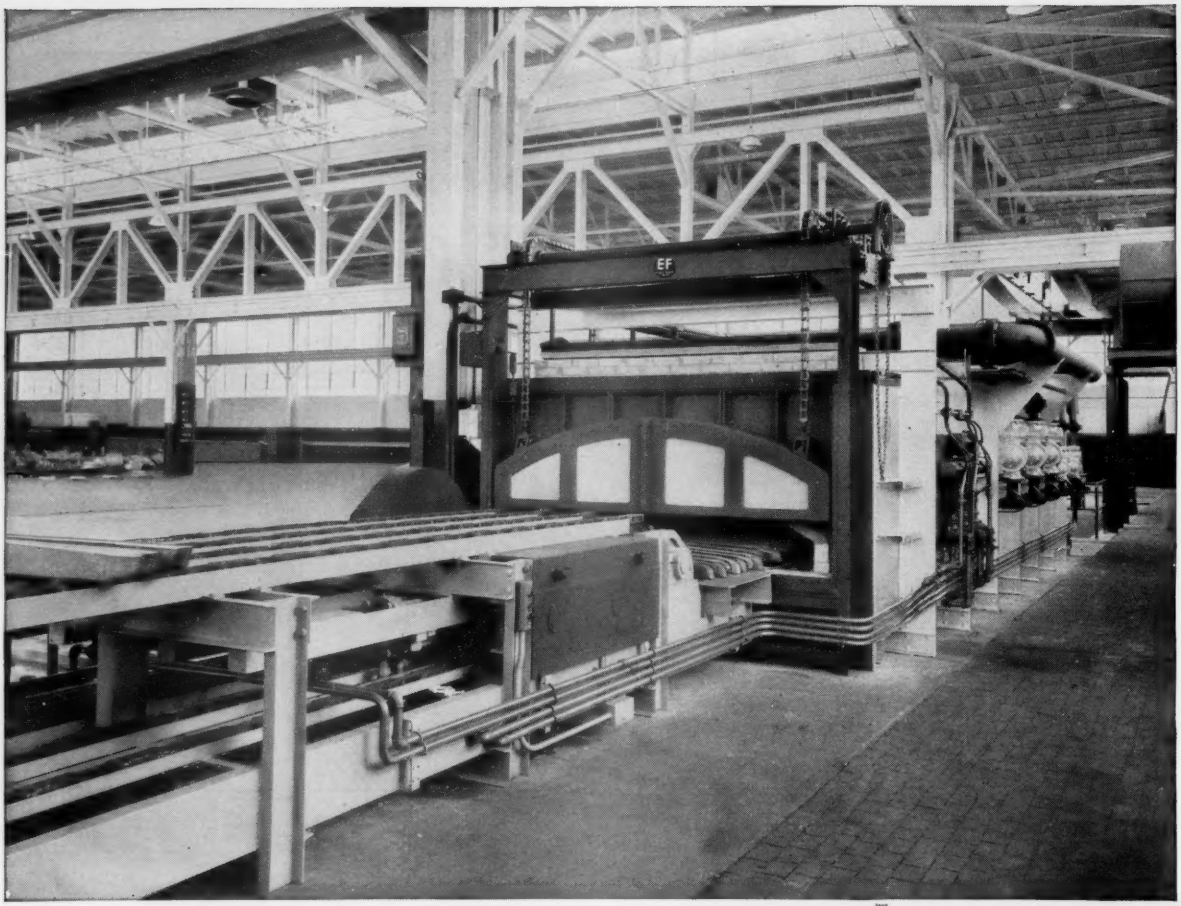
CAPACITIES: A maximum reel load of **three Tons.** Floor Pick-Up for reels of from 24″ to 50″ Flange Diameter with ample floor clearance. Reel width adjustment for reels of from 16″ to 36″ width (greater reel width may be specified, but minimum width will increase correspondingly i.e. 20″ variation remains fixed).

6-SPEED DRIVE, Foot Treadle operated Clutch-Brake, permits gradual acceleration, controlled stops and intermediate slip-speeds.



ENCIRCLED NUMBERS on Cut W-3227-28-A designate and locate:

1. — Electric Motor Control.
2. — Cone Pin Coiling Head 24″ Size, for coils to 40″ O.D.
3. — Coil Width Adjustment Cones. Spring latches, to 12″ widths.
4. — Foot Treadle, convenient location for reeling and coiling.
5. — Reel Drive and Lift Arm.
6. — Drive Dog Shift (insert-withdraw) Handle.
7. — Retractable Drive Dog. Adjustable (CL. to CL.) Dog Pins.
8. — Slideable (pintle withdrawal and reel width adj.) Lift Arm.
9. — Ball Bearing Reel Center Pintle.
10. — Lift Arm Slide Crank Handle.
11. — Hydraulic Lift Pump Handle.
12. — Lift Release Handle, for controlled reel lowering.



EF CONTINUOUS PUSHER FURNACE

HEATS 12,000 LBS. COPPER BARS PER HOUR

● Copper wire bars up to 6 x 6 x 66 inches are uniformly and scale-free heated for rolling in the EF gas-fired, continuous pusher type furnace pictured above. This installation has capacity to heat 12,000 pounds of bars per hour to 1650° F.

The bars are fed to the furnace by a heavy four-strand chain conveyor; deposited on specially designed high temperature alloy water cooled rails; propelled through the furnace by an intermittently operated hydraulic pusher device—and discharged by a hydraulically operated ejector. The air and gas supplied to the burners is pre-mixed in controlled ratio to insure uniform scale-free heating and trouble-free operation.

For dependable, low cost, uniform heating and heat treating results, investigate EF furnaces and developments. Available in gas-fired, oil-fired, and electrically heated designs, whichever best suits your particular problem or location. Sizes and types to meet any requirement. No furnace problem is too big—too small—or too complex for EF engineers. We solicit your inquiries.

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